Annex D

Responses to the

Questionnaire

on

Interoperability, Standards and Functionalities

applied in the large scale roll out of smart metering

in EU Member States

Expert Group 1 – Standards and Interoperability

Smart Grids Task Force

Date: 19 October 2015

Contents

1. Austria

Identification

A. Member State: Austria
Organization (who filled in this questionnaire):
B. Name: E-Control Austria, Rudolfsplatz 13 a, 1010 Vienna, Austria
C. Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: **Leo Kammerdiener, leo.kammerdiener@e-control.at**
D. Type: **Regulator**
E. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **n/a**
F. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: n/a**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes]

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Initial, but also next roll out]

1.2 Will the information provided to the consumer be free of charge? [**Yes]**
If not provided free of charge, what is the business model (e.g. charging model)?

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes]

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Initial, later upgrades, next roll out]
Does this just mean functionality (b) is and will stay implemented, or that is will be extended? If extended, please explain what extra functionalities will be added.

It just means that functionality (b) is and will stay implemented.

2.2 What is the frequency of the information provision to consumers? [**every 15 minutes at least**]. Can this frequency be changed? [**Yes, on a voluntary basis**]. If yes what are the limits? [**seconds**, **depends on technology on the "last mile"**].

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

[Yes, not necessarily on the meter, but compulsive at the website which has to be available for the customer]

Does this mean that the consumer will not be able to see the consumption per tariff zone on the meter?

Yes, at the moment there are no tariff registers implemented directly on the meter. Therefore, in Austria exists the so called DAVID-directive, where the network operator and the supplier are obliged to publish this information on their websites. To be ready for future developments though, the meter is able to receive software updates.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[Initial, later upgrades, next roll out – due to the fact, that the information has to be available for the customer at the website (DAVID-VO as directive), it can be implemented any time and does not depend on the specific meter]

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)	X	X	X	
b)	X	X	X	

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[Initial]]

The H1 interface is a hardware interface on the meter itself where the consumer can connect a display / computer.

So this is implemented?

Yes, this is implemented.

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[No] The H2 interface is a hardware interface on an in-home gateway, where the consumer can connect a display / computer.

So this is also implemented?

This is not implemented.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **[No]**

The H3 interface is a hardware interface on station level (a Data-concentrator for example), that provides a direct connection to the consumer via a Neighborhood Area Network .

So this is also implemented?

This is not implemented.

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades? **[No]**

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? **[no]**

If yes, how is solving of these challenges or barriers foreseen?

[n/a]

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?

[n/a].

We don't understand this, since you have specified in 4.1 that H1 is implemented.

There is no information available regarding the implemented standards at the moment.

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**.**

[n/a]

5.3 What physical interface and communication standards are or will be used on the H2 interface?

[n/a].

We don't understand this, since you have specified in 4.2 that H2 is implemented.

H2 is not implemented

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**.**

[n/a]

5.5 What physical interface and communication standards are or will be used on the H3 interface?

[n/a].

We don't understand this, since you have specified in 4.3 that H3 is implemented.

H3 is not implemented

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**. [n/a]**

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?

[n/a].

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**. [n/a]**

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes] Please explain what elements of the infrastructure are upgradable **[software: possibility of firmware updates is mandatory]**

5.10 What measures are planned to ensure that interoperability is achieved and maintained**?**

[n/a].

No interoperability tests are planned?

We are sure, that interopabilty tests are planned, but detailed information is not available at the moment.

As the Austrian Regulator, we have started a survey regarding smart meter implementation and we have also requested information about H1, H2 and H3 technical standards. These information will be available at the end of June, therefore it could be possible that the given information in this questionnaire has to be updated then.

2. Denmark

Identification

A. Member State: **Denmark**
B. Organization (who filled in this questionnaire):
C. Name: Danish Energy Association
D. Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: Hans Jørgen Jørgensen / hjj@danskenergi.dk / +4520907772
E. Type: **Branch association**
F. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **Not responsible for requirements but answering on behalf of DSO members of Danish Energy Association**
G. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: With a few exemptions, all Danish DSOs are members of Danish Energy Association, and the DSOs are responsible for electricity metering in Denmark.**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

The answers given are only for electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

   Partly.

   For meters in meter systems installed before June 2011, there are no requirements on this functionality. Data are made available to third parties through a central DataHub.

   For new smart meter systems installed after June 2011, the meter shall be able to communicate metered data on the collection and delivery of electricity, for each time series, to the network entity and an external unit (which may then send the data on to a third party). Update 29/7/15 (V1.1): An external Unit is for example an extra in-house display or a Home Automation control unit.

   There are no requirements for an extra in-house display for the meter.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

As mentioned above not included in the initial roll-outs made before June 2011 on a voluntary basis. Some of these meters could be upgraded with an interface for communication of data to the customer.

1.2 Will the information provided to the consumer be free of charge?
If not provided free of charge, what is the business model (e.g. charging model)?
The information will be free of charge.

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented? **Yes.**

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Initial**

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].
All smart meters installed are able to register consumption with a time resolution of either 1h or 15 minutes.

Smart meters in meter systems installed after June 2011 shall be able to register consumption and delivery to the net every 15 minutes, and it shall be possible to change the reading frequency (but not necessarily to more frequent reading than 4 times/hour)

Update 29/7/15 (V1.1): This data can be provided to consumers through either a H1 or H2 interface.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
Yes, but not completely as a functionality in the smart meter system.
When hourly billing of small customers will be made possible – probably in 2016 – all hourly measured consumption values will be made available in the central DataHub, and the suppliers can use these values when calculating the price to pay based on e.g. time-of-use tariffs.
No tariff control possibility is required in the meter system.
Update 29/7/15 (V1.1): The consumer will probably not be able to check the consumption per tariff zone on the meter. The meter is installed by the DSO but the suppliers are responsible for the tariff schemes. It would not make sense to reprogram the meter every time a customer switches to a new supplier with a different tariff scheme.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
Hourly billing will be made possible for all customers at a reasonable cost in 2016.

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
   Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)	X	X		
b)	X	X		

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

For meters in meter systems installed before June 2011, there are no requirements on this functionality. Data are made available to third parties through a central DataHub.

For new smart meter systems installed after June 2011, the meter shall be able to communicate metered data on the collection and delivery of electricity, for each time series, to the network entity and an external unit (which may then send the data on to a third party). This will probably be done using a H1 or H2 interface.

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

Not required, but many of the meters to be installed in the coming years will have a H2 interface

Update 29/7/15 (V1.1): The H2 interface is a two way interface on the meter. No separate home gateways will be used for electricity meters.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

Not required or planned.

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?

The Danish DSOs have chosen various ways to make the frequent meter readings available to the customer, e.g. through a webpage established by the DSO and/or through and app for mobile phones. In the future, the customers will be able to access the data through the DataHub.

Data are typically made available to the customer 1-2 days after the time of measurement, as the registered consumptions are normally collected once every day.

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces?

If yes, how is solving of these challenges or barriers foreseen?

Update 29/7/15 (V1.1): There were no barriers for implementing the interfaces (apart from the fact that they had not been defined at the time of installation) but on the other hand there was no requirement or customer demand for such interfaces

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?
In the Danish regulation, the use of an open standard is required, but no specific standard has been chosen. The manufacturers offer several solutions such as IR optical signalling (EN62056-21) wired M-Bus (EN13757-2), wireless M-bus (EN13757-4), ZigBee, Z-Wave etc.

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**.**
No additional definitions are made. DLMS/COSEM data model will probably be used.

5.3 What physical interface and communication standards are or will be used on the H2 interface?
Different kinds of communication standards are possible, both wired (RS-485) and wireless (wM-Bus). DLMS is used.

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**.**
No additional definitions.

5.5 What physical interface and communication standards are or will be used on the H3 interface? **No use of H3 is foreseen.**

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.**
No additional definitions.

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?
IR – optical eye.

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**.**
IDIS CII has been proposed by manufacturers for the IR optical eye and for the wired M-bus. One manufacturer sees the IR optical eye as an alternative interface.

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)
Some of the existing meters have the possibility of adding plug-in modules with new

functionality. Care should however be taken, that the meter still fulfills the requirements of the Measuring Instruments Directive with these plug-ins installed.

Software download is also possible for some of the existing meters. With software separation (Extension S according to WELMEC Guide 7.2) this is allowed.

Update 29/7/15 (V1.1): Most of the meters installed before June 2011 have the possibility of software download and probably all meters installed after June 2011 have this possibility. Some of the oldest meters (from 2004 to 2007) do not support software download

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing)

No measures planned on a national level.

3. Estonia

Identification

H. Member State: **Estonia**
I. Organization (who filled in this questionnaire): Ministry of Economic Affairs and Communications
J. Name: Viive Savel
K. Contact person, who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: Viive Savel/ viive.savel@mkm.ee/ +372 6256 448
L. Type: **[DSO, branch association, regulator, etc., including name] Information from 8 (out of 36) DSO-s and TSO**
M. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **[clarification]. What geographical part of the country is covered by the 8 DSO's that answered the questionnaire? The biggest DSO (Elektrilevi) covers mostly all of the country (https://www.elektrilevi.ee/en/avaleht), the next two are VKG Elektrivõrgud in north-east of Estonia (http://www.vkgev.ee/eng/about-the-company/about-us) and Imatra Elekter in north-west of Estonia (http://www.imatraelekter.ee/en/).**
N. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: [x%] What part of the country in % is covered by the 8 DSO's that answered the questionnaire? ? The biggest DSO covers 87,5%, the next two cover 2,8% each, 4th covers 1% and the remaining 32 DSOs cover under 1%.**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation] Yes

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Initial, later upgrades, next roll out + planning] Initial

1.2 Will the information provided to the consumer be free of charge? **[Yes/No] Yes**
If not provided free of charge, what is the business model (e.g. charging model)?

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation]
   No, 1 hour period requirement
   As the trading period is 1 hour there is no need for shorter measuring period. Reading cycle frequency (15min vs 1h etc.) should directly result from the local legislation/market rules. It's not feasible to implement very frequent reporting as other systems have to combine these data into bigger intervals (e.g. 15min+15min+15min+15min) and adding then verification logic in external systems.

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial, later upgrades, next roll out + planning] TSO: Later upgrades, DSOs: initial

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].
   Online via data hub. 60 minutes. Once in 24h. Frequency could be changed for some meters but not for all of them in this roll-out.
   This means that 24 hourly values are transferred to "data hub" once per day? Yes.
   Please explain what is a data hub. Is it a web-portal where consumers can read their data? Yes, it is a web portal for metering data exchange for justified persons (market participant, supplier who has an electricity contract with market participant and grid operator who has a grid contract with market participant). The metering data can be exchanged only via data hub. Data hub is not a market place, it does not deliver the prices for instance (it could be done via estfeed platform in the future http://estfeed.ee/en/).

   Electicity Market Act (§ 42[1]):
   https://www.riigiteataja.ee/en/eli/523012015001/consolide#para42b1.

   The data hub's website is here: https://andmeladu.elering.ee/consumer/home

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation] No

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial, later upgrades, next roll out + planning] later upgrades (2 DSOs: for some meters initial but not in use)
   It could be further developed via Estfeed platform http://estfeed.ee/en/

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?

Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a) Datahub (AVP)	x	x		
b) Estfeed API		x	x	

Please explain what is the data-hub and how consumer can retrieve data from this hub. Do you have descriptions? Every consumer can enter data hub via internet and get online (back to five years beginning from previous day) all the information about his/her hourly consumption. https://andmeladu.elering.ee/consumer/home
Please explain what is Estfeed API and in what system this API can be accessed. Who will write a consumer application on this API? Do you have descriptions? http://estfeed.ee/en/

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[Initial], later upgrades, new roll-out + planning] later upgrades
The H1 interface is a direct connection to the meter. Will you install other meters later? Due to grid code, we are going to install only remote meters to all metering points by 2017. If consumer orders any upgrade, it is possible to install (but not obligatory).

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[Initial], later upgrades, new roll-out + planning] later upgrades
The H2 interface is a direct connection to an in-home gateway. Will you install a (new) gateway later? There are no specific plans right now. I think all the smartness will be implemented via data hub and Estfeed http://estfeed.ee/en/.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[Initial], later upgrades, new roll-out + planning] later upgrades

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?
[Provide descriptions of these interfaces: what information, what channel, what time resolution, what refresh rate, whether planned initially or through later upgrades. Clarify if possible with a diagram related to the one in Annex A] Data hub is available and customer is welcome to build applications on top of Data hub (data feed) (H2) and install displays (H1). Regulation change and reconfiguration of meters needed if less

than 60 min time span is needed. It looks that max 30% of meters can apply for such change.

The H1 interface is a direct connection to the meter. The H2 interface is a direct connection to an in-home gateway.

Can you please explain how a consumer can create an application to read the data from these interfaces? We consider all the information being available through data hub and estfeed platform, so there would be no need to install in home displays in particular. However, it would be possible if consumer wanted it.

1 DSO: YES, We have a portal where consumer can take all information (prices, cost, consumption,raports, graphs,heatmap and etc). https://wizener.com/

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? **[yes/no]**

If yes, how is solving of these challenges or barriers foreseen?

[open answer] If needed, there must be regulation allowing consumer to order reconfiguration of its metering device (no DSO sees the need of "overregulation").

H2 and H3 – implementation of these interfaces, especially H3 might pose security risks towards the network infrastructure set in place by the DSO. Also exposing and handling of security keys to 3rd parties for accessing the NNAP nodes poses an increased cost for DSO-s. H1 implementation is more cost efficient through web-enabled services (web portal plus mobile apps) – it ensures access to the information where ever required

Interoperability H1, H2, H3, and other interfaces

1.1 What physical interface and communication standards are or will be used on the H1 interface?

[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][Also specify specific versions and additions that are implemented]. CENCENELEC/ETSI standards/ IEC/ISO standards

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**.**

[open answer] No definitions yet. National technical committee is formed for the purpose.

5.3 What physical interface and communication standards are or will be used on the H2 interface?

[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][Also specify specific versions and additions that are implemented]. TSO: CENCENELEC/ETSI standards/ IEC/ISO standards/national recommendations

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**. [open answer] No documents.**

5.5 What physical interface and communication standards are or will be used on the H3 interface?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][**Also specify specific versions and additions that are implemented]. TSO: CENCENELEC/ETSI standards/ IEC/ISO standards/national recommendations**

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**. [open answer] CENCENELEC/ETSI standards/ IEC/ISO standards/national recommendations**

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][**Also specify specific versions and additions that are implemented]. No specific standards planned.**

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**. [open answer] No documents**

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)
TSO: Yes. Metering devices are planned for medium/high voltage area and have more configuration options than low voltage devices. Software must be consumer specific. Centrally is provided PKI, authentication services, data hub for metering data, rights management, secure data channels, trust source and example applications.
This question was meant to understand if hardware/software and easily be replaced. For example replacement of communication interfaces and upgrade of firmware/software.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing) [open answer]. **Ease of access to consumption data and privacy rules implemented.**
No interoperability testing or certification is foreseen? No – all the information (metering data) is already (from 01.01.2013) processed via data hub.

4. Finland

Identification

Member State: **FINLAND**
Organization (who filled in this questionnaire):
Name: **Ministry of Employment and the Economy with the help of Finnish Energy Industries**
Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: **technical questions: Mr. Markus Piispanen, Finnish Energy Industries markus.piispanen@energia.fi, +35844 539 4777**
general questions: Mr. Tatu Pahkala, MEE, tatu.pahkala@tem.fi, +35829 506 4217
Type: **ministry with the help of branch association**
if you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area:
If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: 100%**
Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

All the answers are considering electricity as roll-out of smart meters in the gas sector is voluntary. However, most of the smart meters in the gas sector share the technical features of those in the electricity sector.

In the electricity sector the industry had given out recommendations for the DSOs to install smart meters for 80% of the customers by 2014 already in 2007. This development was then later fortified with a government degree in 2009 with the same objectives. Today the penetration of smart meters is somewhere between 97% and 100%.

One has to note that the roll-out in Finland was initiated at a time when there were no common pan-European guidelines for the functionalities in the smart meters.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   Yes.

   1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Initial.**
   1.2 Will the information provided to the consumer be free of charge? **[Yes/No]**
   If not provided free of charge, what is the business model (e.g. charging model)?
   Yes, two ways

- **raw real time consumption data from the meter: standardized output has to be provided upon customer request (most commonly pulse LED)**
- **hourly validated consumption data (same as used in billing and balance settlement) provided via DSO online service one day after delivery**

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented? **Yes**.

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Initial**

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].
The information is provided two ways:

- **Real time raw consumption data provided every 10 Wh (the accuracy of the meter), fastest every 0,5 seconds (approximation of the meter reading frequency) – current frequency is the fastest possible**
- **Validated hourly data provided once a day, one day after delivery – current frequency could be changed, but it would create huge costs and in many cases not provide necessary reliability due to possible telecommunication problems.**

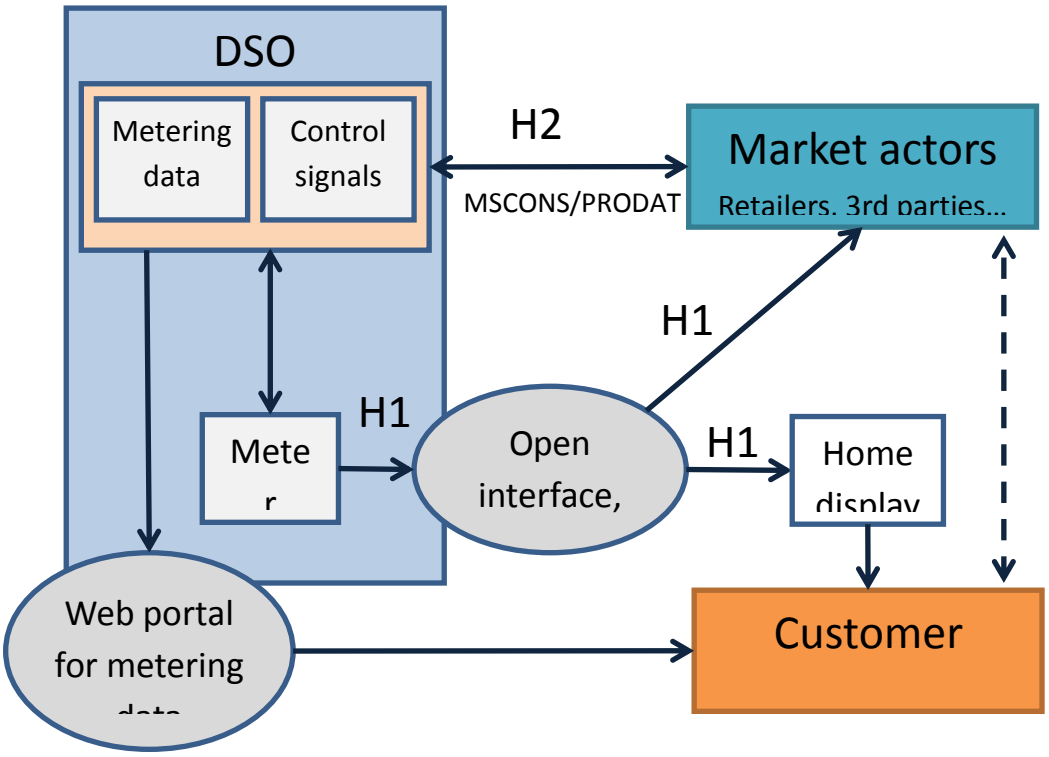
3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented? **Yes.**
Update 29/7/15 (V1.1): You cannot read the tariffs from the meter itself, but through web portal.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Initial**

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
Please cross the cells in the following table
The Finnish (and the Nordic) data exchange system differs somewhat from the principles shown in Annex A and therefore it is not straightforward to answer all the questions. The picture below shows an outline of the data exchange between the parties and how H1 and H2 could be interpreted in this context. However, H3 remains a mystery to us.

The legal framework stipulates that the DSO should provide upon customer request a measurement device with a standardized interface for real-time consumption data. At the time of the legal drafting (2008-2009) there were no pan-European standards for this connection but the manufacturers had their own standards. It was considered to be detrimental for competition if one manufacturer's standard would have been chosen at

that time of legal drafting. Therefore, multiple (standardised) implementations exist for the interface.



Interface Functionality	H1	H2	H3	Other
a)	x	(x)	?	
b)	x	(x)	?	web portal for hourly measurement data

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

Initial

This is done via ability to connect an inhome display (provided to the customers by competitive markets) to a standard real time output on the meter.

Examples of techniques used (depends on the meter type): Pulse-LED, CBand (PLC), ZigBee test-led, opto-mos relay output, opto-port, MBUS-radio interface, serial interface (different protocols available).

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

Initial

As we understand H2, it is the communication interface between the market actors and the DSOs. This data exchange is carried out with EDIEL messages. The hourly consumption data is sent to the market actors once per day.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

It is unclear what is meant by H3. Please see description of the Finnish system above.

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?

Initial

Online reporting service provided by the DSO. Hourly data (same validated data that is used for billing and balance settlement) available one day after delivery.

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? **[yes/no]**

If yes, how is solving of these challenges or barriers foreseen?

No (for H1 and H2)

Not possible to answer for H3, because not clear what it means

Update 29/7/2015 (V1.1): Some countries have already carried out a full-scale roll-out of smart meters, such as Finland. At the time when the roll-out was initiated in Finland (2009) there were no solid European standards for many of the issues dealt with this working group and therefore there are many implementations for e.g. to the interface for real time data. There is a big potential of stranded investments and extra costs for consumers if the proposed standards have to be implemented without sufficiently long transitional period

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?

This depends on the meter type. The examples given below cover at least 80% of all meters in Finland.

Examples:

- **Echelon: IEC62053-31 / DIN 43864. For direct meters 1000 imp / kWh for indirect meters 1000 imp / kWh of the power in secondary circuit.**
- **Landis-Gyr: In a Local Data Transition Interface (Customer Information Interface, CII, M-Bus port EN13575-2) there will be a physical connector (RJ) on the cover of the terminal block. Interface is according to the standard "IEC 62056-7-5 LDTI". That is available to an end user and a Home Automation System. Used protocol is according to DLMS/COSEM. In addition to data also a small amount of power is available in the interface. It means that it is possible to connect e.g.**

local radio-hub near the meter and a supply power is having from the meter. Data content can be programmed freely via a system.

- **Aidon: pulse LED and serial interface. Possible to remotely upgrade device to support different protocols.**

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**. [open answer]**

See answer to the question 5.1.

5.3 What physical interface and communication standards are or will be used on the H2 interface?

[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][Also specify specific versions and additions that are implemented].

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**. [open answer],**

In the communication between the market actors and DSOs standardized Ediel/Edifact messages (MSCONS, PRODAT) are being used. Please see the outline in question 4. More information about the message formats can be found at www.ediel.org**.**

It has to be noted that communication through this interface takes time. The measurement data are being sent once a day and requests for e.g. disconnections by the retailer takes some days. This is due the technology used to transfer the data from the meter. As Finland is sparsely populated wireless communication (GPRS) is predominant technology in transferring data from and to the meter. To be able to communicate closer to real time through this channel would in essence require broadband connection to every house. At the time of the roll-out this was not foreseeable in the near future and therefore it was not mandated to include real time communication capability to the meters.

5.5 What physical interface and communication standards are or will be used on the H3 interface?

It is unclear what is meant by H3.

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.**

It is unclear what is meant by H3.

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?

DSO online service must provide data in .xlsx or .csv format. Also DSOs are obliged to provide consumption data to customer and/or customer designated 3rd party via MSCONS-messages upon customer request (it is allowed to charge customer from doubling the data).

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**. [open answer]**

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)

All hardware is naturally upgradable (new roll-out!), but extremely costly to do so before the end of natural lifetime of the meters and metering systems. Also software is upgradable, but there is only limited possibility to affect the functionalities though updates.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing) [open answer].

The Finnish TSO Fingrid has carried out a vast study on future data exchange solutions in 01-12/2014. The study concluded to recommend a centralised data exchange solution (datahub). Implementation time for the datahub solution is ca. 4-5 years. The datahub would create a standardized interface for all participants (DSOs, retailers, 3rd parties) to access consumption data, on customer's acceptance.

5. France

General Directorate of Energy and Climate, Office of electrical grids and energy regulation/ERDF: Gas Meters

A. Member State: **[FRANCE]**
B. Organization (who filled in this questionnaire):
- Name: **[Direction Générale Energie Climat]**
- Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: **[David Krembel]**
- Type: **[Authorities]**

C. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **[Gas Smart Meter]**
D. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: [>95%]**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation]
   Yes. Access to consumption data is able remotely from a website and locally by connecting a device on the meter.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Initial, later upgrades, next roll out + planning]
Initial.

Will the information provided to the consumer be free of charge? **[Yes/ No, comments and argumentation]** If not provided free of charge, what is the business model (e.g. charging model)?
Yes from the DSO and supplier websites. Raw information are also available locally free of charge, provided that a specific device is connected locally to the meter..

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation]

Yes. On the Website, consumption data are updated daily, with a step of one hour for customers who request it. Locally, consumption data are provided in real time and could be used by external devices when installed.

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **[Initial]**

2.2 What is the frequency of the information provision to consumers? [every day on the website, in one hour interval basis for the customers who requested it. In real time locally]. Can this frequency be changed? [Yes, for DSO purpose, some meter could be provided their data consumption each 15 mn on the Website]. If yes what are the limits? [15 minutes].

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
[No, feature not selected for gas in France, in agreement with the French regulator and all the Gas providers.]

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **[No]**

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)	X			
b)	X			

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **[Initial]**

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Never, not relevant in the architecture]

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Never]

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades? **[Data consumption collected by the SMG are stored in the MDM and can be access by a website.]**

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? **[H2, H3 not relevant in the architecture of the system]** If yes, how is solving of these challenges or barriers foreseen? **[open answer]**

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface? **[IEC/ISO Standard].**

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**.** **[Consumption pulse collected on the meter are copied to the H1 interface without transformation]**

5.4What physical interface and communication standards are or will be used on the H2 interface?
[Not relevant].

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**.** **[Not relevant]**

5.6 What physical interface and communication standards are or will be used on the H3 interface?
[Not relevant].

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.** **[Not relevant]**

5.8 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?
[Not relevant].

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**.** **[Not Relevant]**

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes. Software of the SMG and Smart Meter are upgradable. SMG is also upgradable at the hardware level for increase capacity] Please explain what elements of the infrastructure are upgradable (hardware and software)

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing) [CEN TC 294 EN 13757 is used in the communication between Meters and SMG. Qualification Tests are set up in laboratory to ensure the interoperability and conformance of all the equipments.].

General Directorate of Energy and Climate, Office of electrical grids and energy regulation/ERDF: Electricity Meters

A. Member State: **FRANCE**
B. Organization (who filled in this questionnaire):
– Name: **General Directorate of Energy and Climate, Office of electrical grids and energy regulation**
– Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: Martial MONFORT martial.monfort@erdf.fr +33 1 81 97 22 78

Hélène PULCE helene.pulce@erdf.fr +33 1 81 97 41 96
Roman Picard roman.picard@cre.fr +33 1 44 50 42 30
Sabine CORCOS sabine.corcos@developpement-durable.gouv.fr +33 1 40 81 96 54

– Type: - **DSO** : ERDF manages more than 95% of French electricity distribution networks. ERDF is in charge of operating the electricity distribution networks, that means between the primary HV/MV substations to the below part of the electrical circuit breaker inside customer electrical cabinet. Regarding metering system, ERDF provides and operates the metering infrastructure (from the IT management system to the electricity meter).

- **Regulator** : *Commission de régulation de l'énergie* (CRE)

C. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area:

To comply with the European Directives related to energy efficiency, and in conjunction with the Energy Regulation Commission (CRE), ERDF is implementing a plan to modernize its 35 million electricity meters nationwide. This is the Linky project.

In his statement of 6th June 2007, the French Energy Regulator (CRE) has defined the list of key functionalities that have to be implemented in the Linky meter in order to offer new services to the customers. ERDF has taken into account all these requirements in its Linky system in a first pilot in 2010 (300k meters in the regions of Lyon and Touraine) which enables to validate the Linky functionalities for the customers and all concerned parties (DSO, suppliers, ...).

Besides, the good results performed during this first Linky pilot have made the CRE to approve the technical architecture proposed and tested by ERDF. In particular, the choices of PLC technology on LV networks for the remote metering reading, as well as the "TIC" interface for the supply of energy information to the customer, have been validated as the solution to be deployed for the massive Linky roll-out.

If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**:**

ERDF is in charge of 95% of French electricity distribution networks.

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

   Yes, this function is implemented in the Linky meter. It provides "real time" metering data to the customers such as current consumption indexes, current tariff, warning about peak hours, …, and also short messages which can be read and automatically managed by in-home devices. This information is delivered inside the customer household thanks to the "TIC" interface (see description below in H1).

   In addition, customers will be able to connect to a dedicated website and consult at free charge and in a secure way their personal energy data.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

   This function will be available since the first Linky meters massive roll-out beginning at end 2015.

1.2 Will the information provided to the consumer be free of charge?

   Yes, the supply of information to the consumer is totally free of charge.

If not provided free of charge, what is the business model (e.g. charging model)?

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

Yes, this function is implemented in the Linky meter. The "real time "data information provided by the TIC interface are updated nearly every 2 seconds. Besides, the Linky meter measures and stores the energy power at periodic time slots (indexes, load profiles).

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

This function will be available since the first Linky meters massive roll-out beginning at end 2015.

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].

Regarding the "TIC" interface, the frequency is nearly every 2 seconds.
Regarding the load curve storage, the frequency can be adjusted between different set of values (0, 10, 15 or 60 min). On default, the frequency is set to 0 (no load curve). This feature can be changed remotely by the PLC interface between the Linky meter and the above IT system.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

Yes, this function is implemented in the Linky meter. The Linky meter support advanced tariff systems (time of use and peak tariffs). Actually, the Linky meter is able to manage up to 10 indexes for the supplier contract, and 4 other indexes for the electricity distribution network access. It includes a tariff calendar managing 12 season profiles, 8 week profile, 10 day profiles (among them 3 can be used for peak tariffs). In addition, each day can be split into 11 time slots.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

This function will be available since the first Linky meters massive roll-out beginning at end 2015.

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)	X		X	
b)	X		X	

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

From the initial implementation
The H1 interface is the TIC interface which is included inside the Linky meter.

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Not concerned**

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **From the initial implementation**

The H3 interface is the PLC communication link between the DC (Data Concentrator) and the Linky meter. The PLC modem is included inside the Linky meter.

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?
No other interfaces are implemented.

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces?
If yes, how is solving of these challenges or barriers foreseen?

Regarding the H1 interface :
For security reasons implied by the French National Security Authority (ANSSI), it has not been allowed to provide a bidirectional communication link between the Linky meter and the TIC interface. Data are only transmitted from the meter to the customer household.

Regarding the H3 interface:

In France, PLC solutions designed for smart metering applications use the European standardized frequency band 2-150 kHz. According to the European standard EN 50160-1, metering devices are allowed to transmit in this frequency band with limited levels of voltages. However, few electric equipments which are connected to low voltages networks (on distribution networks or on customers households) generate more and more disturbances in the same frequency band 2-150 kHz, due to energy efficiency requirements and technology changes (ex. : switch mode power supply with higher frequencies). For more details, please see the Study Report on electromagnetic interference between electrical equipment/systems in the frequency range below 150 kHz which has been conducted by the CENELEC Task Force SC205A.

All these disturbances can have an impact on the quality of PLC communication, and in some cases can prevent any data transmission on the PLC networks. This EMC problem has been raised three years ago and a dedicated IEC working group (IEC SC 77A/WG8) has been created in order close the gap between the PLC users among them DSOs play a main role on one side, and the electrical equipment manufacturers on other side. Today, the situation is very tight and there is a risk that not any compromise could be achieved between all SC77A/WG8 members. That's the reason why all European DSOs using PLC interfaces would need a stronger regulation to protect PLC communications involved in smart metering systems. This a key issue to ensure the supply of services to all customers with a good level of performances.

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?

TIC interface. It relies on the international standard CEI 62056-7-2 CEI:2012 : One-way communication profile using 56-3-1.

This communication standard has been used from nearly 20 years in all ERDF solid state electricity meters (more than 15 million meters yet installed on the field). Few thousand energy management devices using this interface are connected to ERDF electronic meters.

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents.

The use of international standards ensure interoperability between different devices. Besides, ERDF performs few tests in order to check the compliance of its meters with this standard.

One of the feedbacks of the test phase was that the local interface was already used (in historical mode for nearly 20 %) the current electronic meters.

Historical mode uses: *ERDF-NOI-CPT-02E*: sorties de télé-information client des appareils de comptage électroniques utilisés par ERDF (please find the document attached)

5.3 What physical interface and communication standards are or will be used on the H2 interface?

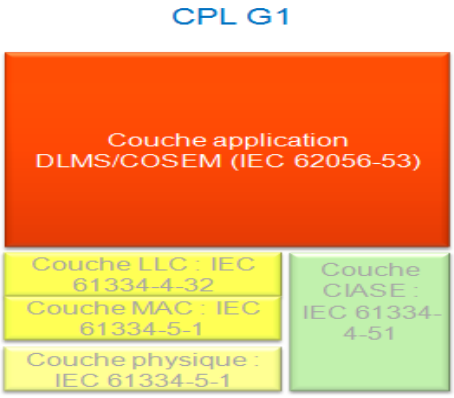
ERDF is not concerned by H2 interface.

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents.

5.5 What physical interface and communication standards are or will be used on the H3 interface?

The H3 interface is the PLC link which enables the communication between the DC and the meter on the LV network. Two PLC technologies have been chosen by ERDF for the Linky massive roll-out:

- at first, for more than 2,5 million meters, the G1 PLC technology will be used. The G1-PLC metering profile relies on different international telecom standards described as below:

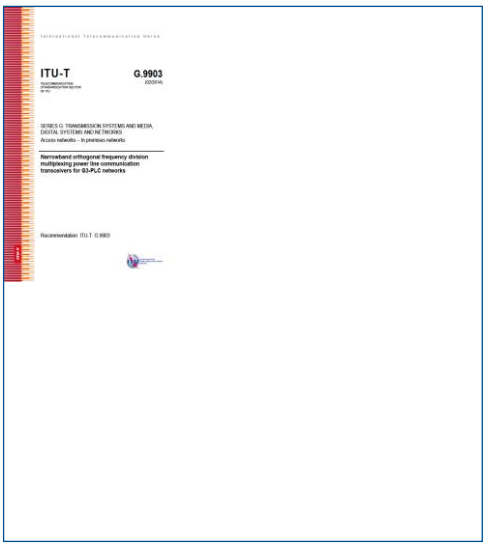


In particular, on applicative layer, this is the DLMS/COSEM standard which is used and commonly implemented for few decades by many manufacturers and utilities in their electricity meters (*NF EN 62056-3-1* May 2014 Electricity metering data exchange – The DLMS/COSEM suite – Part 3-1: DLMS/COSEM Use of local area networks on twisted pair with carrier signaling, *NF EN 62056-5-3* May 2014 Electricity metering data exchange – The DLMS/COSEM suite – Part 5-3: DLMS/COSEM application layer, *NF EN 62056-6-1* December 2013 Electricity metering data exchange – The DLMS/COSEM suite – Part 6-1 DLMS/COSEM Object Identification System

(OBIS), *NF EN 62056-6-2* December 2013 ELECTRICITY METERING Electricity metering data exchange – The DLMS/COSEM suite – PART 6-2 DLMS/COSEM Interface classes).

These G1 meters will be deployed from December 2015 to end of 2016.

- **At a second step, for the main part of the massive roll-out that means more than 32 million meters, the G3-PLC will be used. The G3-PLC specifications have been standardized in ITU (International Telecommunication Union) as ITU-T G.9903. The standard has been released in April 2014 and is available for free on the ITU website (www.itu.int/rec/T-REC-G.9903).**



The G3-PLC meters will start to be deployed at beginning of 2016 for a large scale field test, and then the massive roll-out will speed up since 2017.

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.**

Regarding H3 interface, interoperability between the DC and PLC meters provided by several manufacturers is a key point for ERDF.

As well for G1-PLC as G3-PLC technologies, the use of international telecom standards is a good way to ensure that devices produced by different manufacturers can operate each other. Manufacturers and ERDF have to check in their labs if the products are fully compliant with the standards.

In addition to lab tests, some interoperability field tests are useful.

For G1-PLC technology, the first 300k meters pilot has enabled to fix the right PLC parameters in order to ensure good performances in interoperability conditions (2 DC, 3 meters).

For G3-PLC technology, there are many solutions (chipsets as well as meters) which are able to work properly in full interoperability conditions. Since September 2014, all these devices can be certified by the G3-PLC Certification Program offered by the G3-PLC Alliance. The updated list of

the certified solutions is published on the G3-PLC website (http://www.g3-plc.com/content/g3-plc-certified-products).

Nevertheless, all these tests are performed in lab conditions and interoperability must be validated as well on the field. That's why ERDF is going to launch at end April 2015 a new field test with G3-PLC meters provided by 3 different manufacturers. It will be the 5k G3 Interoperability pilot carried out in the regions of Nantes and Pas de Calais. The feedback of this new trial will enable ERDF to fix all the G3-PLC parameters in order to enhance the good performances of Linky system.

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?

NF EN 62056-31 **May 2014 Electricity metering - Data exchange for meter reading, tariff and load control - Part 31: Use of local area networks on twisted pair with carrier signaling**

Besides, a project of law provides that an in-home display using H1 interface should me made available to vulnerable costumers (without extra charge in this case). An evaluation will be conducted before a potential widespread.

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**. No other interfaces are implemented.**

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)

On software side, the firmwares embedded inside the Linky meters except the part of the software related to metrology (Legally Relevant Code) can be upgraded remotely by PLC as often as needed. Actually, all functionalities related to energy management (tariffs, power management, load curves…) are included in the Non Legally Relevant which is fully upgradable. Therefore, if additional functionalities are necessary in the future to provide new services to the consumers, it will be possible to include them in the current Linky meters during their whole lifetime (20 years at least).

On hardware side, the meters can not be upgraded unless removing them and changing them by new ones.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing)

Interoperability is a key issue for ERDF. For Linky metering system, there are few measures which ensure that interoperability is achieved:

- First, as said above regarding the H1 and H3 interfaces, ERDF has chosen to rely on standardized specifications that can be shared and implemented by many manufacturers all over the world; for instance, any customer device compliant with the TIC standard can operate with the Linky meter without any change;

- Then, the compliance with ERDF specifications is a way to guarantee that different meters or DC can work each other;

- Finally, ERDF performs various tests on his labs or in the field to check if different meters can work and communicate properly in interoperability conditions.

Regarding G3-PLC communication, ERDF can rely also on the certification program provided by the G3-PLC Alliance. Therefore, the G3 PLC chipsets embedded in the Linky meters or DC. At end of March 2015, 23 G3-PLC platforms had been certified.

6. Greece

Identification

C. Member State:
GREECE

D. Organization (who filled in this questionnaire):
- Name: **HEDNO**
- Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions:
Konstantinos Andreadis / k.andreadis@deddie.gr / +30 210 9090820
- Type: **[DSO, branch association, regulator, etc., including name]**
DSO

E. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **[clarification]**
HEDNO is the sole DSO for Greece

F. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: [x%]**
100%

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

The following answers are only for electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

The roll-outs that involve smart meters are:

1. **Fully realized rollout for all MV customers - approximately 13,000 customers.**
2. **Ongoing Rollout, Big LV customers (> 55KVA) - approximately 60,000 customers and 12,000 PV producers.**
3. **Pilot project No ND-207 (approximately 200,000 customers), in tender phase.**

Can you indicate if and, if yes, when a full roll-out for small LV consumer will take place?

A mass roll-out is foreseen, and it is expected to start upon the completion of the aforementioned pilot project.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation]
   Yes.
   Functionality (a) is implemented for all realized and ongoing rollouts.
   Especially for the pilot project, it is envisaged that in-home displays, a web portal and mobile phone platform will be deployed and tested during pilot scale implementation; real time consumption data will be made available to customers through the in-home displays; web and mobile phone platforms will provide customers with access to historical consumption data; according to the specification for the pilot scale deployment, smart meters will be equipped with a local interface that could enable remote and/or automatic control of customer facilities.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial, later upgrades, next roll out + planning
   Initial and next rollout/planning.
   Functionality (a) is implemented for all realized, ongoing and planned rollouts.
   During pilot scale implementation, in-home displays will be deployed to a subset of the total number of customers receiving smart meters; all other information provision functionalities (web portal, mobile phone platform) will be available to all customers at initial implementation.

1.2 Will the information provided to the consumer be free of charge? **[Yes/No]**
   Yes, for the moment.

   If not provided free of charge, what is the business model (e.g. charging model)?
   N/A

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation]
   Yes.
   Functionality (b) is implemented for all realized, ongoing and planned rollouts.
   Real time access to consumption data will be available through in-home displays; access to historical consumption data will be available through web portal and mobile phone platform.

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial, later upgrades, next roll out + planning]
   Initial and next rollout/planning.
   Functionality (b) is implemented for all realized, ongoing and planned rollouts.

2.2 What is the frequency of the information provision to consumers? **[every x seconds/minutes]**. Can this frequency be changed? **[Yes/No]**. If yes what are the limits? **[x-y seconds/minutes]**.
Meter registers record energy readings every 15 minutes. This frequency can be set from 1 minute to 60 minutes, at specific steps.
Real-time information (< 30 seconds) to the customer can be achieved through pulse outputs or In-Home Displays.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented? **[Yes/ No, comments and argumentation]**
Yes.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **[Initial, later upgrades, next roll out + planning]**

Initial and next rollout/planning.
Functionality (f) is implemented for all realized, ongoing and planned rollouts.
Especially for the pilot project, advanced time-of-use tariffs, configured remotely, are envisaged to be supported by smart meters from initial implementation.

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)	**X**			
b)	**X**			

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **[Initial], later upgrades, new roll-out + planning]**

Initial and next rollout-outs/planning
H1 is implemented for all realized and ongoing rollouts. Readings are available using pulse outputs.
Please indicate how these pulse outputs are transferred to a readable format (kW or kWh) to the consumer.
Using third-party devices that connect directly to the meter; readings can be available to consumers.
The pilot project smart meters will implement uni-directional interface with In-Home Displays (IHD).

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **[Initial], later upgrades, new roll-out + planning]**

H2 is not implemented.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **[Initial], later upgrades, new roll-out + planning]**

H3 is not implemented or planned.

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades? **[Provide descriptions of these interfaces: what information, what channel, what time resolution, what refresh rate, whether planned initially or through later upgrades. Clarify if possible with a diagram related to the one in Annex A]**

Information is available through a web interface.

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? **[yes/no]**

Yes

If yes, how is solving of these challenges or barriers foreseen?

[open answer]

Regulatory challenges are present about who is responsible for the implementation of H1, H2 or H3, DSO or Suppliers.

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?

[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][Also specify specific versions and additions that are implemented].

Open standards according to CENCENELEC/ETSI/IEC/ISO.

Can you please indicate the physical interface: how is the IHD connected to the Smart Meter? Is this a wired or wireless connection?

And which standard is used? Can you please indicate the number(s) of the standard(s).

Currently, no IHD are used. HEDNO intends to install IHD devices for the pilot project. According to Tender specifications, In-Home Display (IHD) will communicate with the electronic meter using acceptable wireless communication methods (Bluetooth, ZigBee, etc.) or via PLC

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**.**

[open answer]

Open standards according to CENCENELEC/ETSI/IEC/ISO (e.g. DLMS/COSEM)

Are there any specifications of the data that will be transferred to the IHD and how? It is important to know what services of DLMS/COSEM will be used.

Currently, no other additional definitions are made. According to the tender specifications, IHD shall save and display the electricity consumption history of at least the last 24 months with a minimum of monthly resolution, receive and display simple messages from the central AMI/MDM system and receive, save and renew data of the metering system.

5.3 What physical interface and communication standards are or will be used on the H2 interface?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][Also specify specific versions and additions that are implemented].
N/A

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**.**
[open answer]
N/A

5.5 What physical interface and communication standards are or will be used on the H3 interface?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][Also specify specific versions and additions that are implemented].
N/A

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.**
[open answer]
N/A

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][Also specify specific versions and additions that are implemented].
Open standards according to CENCENELEC/ETSI/IEC/ISO.

Can you give us the numbers of the standards used?

Currently, there is no decision about that particular issue. As it is specified in the tender issues, tenderers are welcome to propose/use any CENELEC/ETSI/IEC/ISO standards or emerging standards that are currently under approval process by CENELEC, and the functionalities recommended by 2012/148/EU will be implemented.

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**. [open answer]**
Open standards according to CENCENELEC/ETSI/IEC/ISO.
Are there any specifications of the data that will be transferred and how?
Currently, no other additional definitions are made.

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)

The infrastructure plan is according to open standards (CENCENELEC/ETSI/IEC/ISO). Meters have the ability to communicate through standard interface ports (e.g. RS485).

The question refers to the possibility to upgrade the Smart Meter Infrastructure. For example: can communication interfaces be replaced? Can software/firmware of specific components be upgraded?

Yes, Smart Meter infrastructure is envisaged to be upgradable, including operating systems, software, metering firmware etc)

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing) [open answer].

Open standards according to CENCENELEC/ETSI/IEC/ISO.

Is any conformance testing or certification foreseen?

Meters should come from at least two different manufacturers for each meter type. Interoperability is ensured by Conformance certificates issued by independent laboratories and submitted in the Tender and interoperability tests performed during tender's technical evaluation.

The interoperability and the interchangeability between meter types shall be demonstrated by the execution of commands and metering data transmission to and from the concentrator from the different offered meter types prior to the project's execution.

7. Ireland

Remark: the answers from Ireland have been updated 29/7/15 (V1.1) based on comments received by CER.

Identification

A. Member State: **Ireland**
B. Organization (who filled in this questionnaire):
- Name: **Commission for Energy Regulation (CER)**
- Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: **National Smart Metering Programme (NSMP) (smartmetering@cer.ie)**
- Type: **National Regulator**

C. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **The CER is responsible for defining all policy requirements for smart metering. Functionality, interfaces and standards are the responsibility of the Electricity and Gas System Operators procuring the system and meters.**
D. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: The CER is responsible for overall delivery through appropriate regulatory direction to the Networks and Supply businesses to achieve the EU Directives for the entire geographical region.**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   Functionality (a) is proposed by the provision of a standardized interface for the provision of 'near real-time' data within the home via the H2 interface. Data retrieved by Actor B is made available by market processes to industry accredited Actor A (energy suppliers). At this point in time, there are no industry accredited 3rd party roles, however these parties are acknowledged in our high level design. The customer will be able to access their data from Actor A and/or B in a standardized format, which the customer can then choose to provide to a 3rd party.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

The National Smart Metering Programme (NSMP) is currently in phase 3 (detailed design & procurement). Rollout is expected to begin mid 2018, with 80% installed by 2020. Functionality (a) will be available to customers from mid 2019 according to current plans.

1.2 Will the information provided to the consumer be free of charge? **Yes**
If not provided free of charge, what is the business model (e.g. charging model)?

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
Yes. 'Near real-time' data is to be made available in the home via a standardized H2 interface for electricity, and gas data at 30 minute intervals. The detail of the content, granularity and frequency of this data is yet to reach final specification but will comply with functionality (b). The historical 30 minute interval data will also be made available to customers via a downloadable file on request as follows:

a. For at least 24 months or from the start of their supply contract, whichever is shorter (Actor A); or,
b. For at least 24 months or from the point of smart meter installation, whichever is shorter (Actor B).

Q. This means that the meter will store 24 months of data, which can be retrieved through the H1 interface on the meter? Or is the historical data to be received through a website?
A. The data storage period on the meter has not been decided. DSO's will be tasked with ensuring there is sufficient data storage on the meter in line with the high level requirements.
The H2 interface will provide the means for 30 minute interval data to be collected routinely by device(s) within the home and it will be the limitation of those devices that determine the period of interval data available to the customer in the home. It is not intended to allow user interrogation of the meter to access any historically stored data. 24 months of 30 minute interval data will be made available via a downloadable file by Actors A&B as described above.

Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

Functionality (b) will be available to customers as soon as industry market processes are implemented, currently scheduled for mid-2019.

2.1 What is the frequency of the information provision to consumers?
Near real-time information will be available over the standardized H2 interface. Information provision to customers via Actors A&B will be based on interval readings made available the following day, with the freedom to offer billing and other data services at any desired frequency that meets or exceeds the EU Directives.

Can this frequency be changed?

No. It is hard to envisage the need for the frequency of information provision to consumers greater than "near real-time". Billing and data service frequencies are open to competitive choice.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
It is currently intended that "time of use" tariffs will be applied to all domestic and small SME customers.

Full flexibility for advanced tariff structures are supported by the provision of 30 minute interval data for Suppliers (Actor A) to apply their tariff unit prices. Only the cumulative register is displayed on the meter.

For exceptional circumstances where the remote capture of daily interval data is not possible, the smart electricity meter will be configured to record and display registers for a Standard ToU Tariff (still to be determined).

The smart metering system does <u>not</u> allow automatic transfer of information relating to advanced tariff options via a standardized interface. Instead, the proposed model identifies a set of minimum requirements regarding advanced tariffs which must be provided by the Suppliers (Actor A) to Consumers via non-smart metering system channels (e.g. internet).

Remote tariff control is only being envisaged for legacy night storage heating applications.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
When such tariffs will be available to the market is being consulted upon currently. The earliest possible date will be mid-2019 (as referred to in response to 1.1)

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)	N	Y	N	
b)	N	Y	N	

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

No H1 interface is envisaged. Data provision into the home for simple display or energy management will be via the H2 interface although the 2-way functionality "TO the

meter" is only envisaged for the secure pairing of in-home devices with the electricity meter.

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

The H2 Interface and the provision of the harmonised downloadable file (HDF) by both DSOs and Suppliers will be in effect from market systems implementation.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

No H3 interface is envisaged via the smart metering system.

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?

The smart metering system caters for the provision of energy related information from the meters via the H2 interface. Alternate channels to devices in the home are envisaged for additional data or control services. This is regarded as space for innovation and competitive choice.

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces?

The NSMP aims to provide an open architecture solution that minimizes challenges in relation to complex policy and design choices that may reduce the prospect for timely delivery. It is recognized that achieving universal coverage for the H2 interface is a considerable technical challenge but maximizing coverage is important.

If yes, how is solving of these challenges or barriers foreseen?

The NSMP believes these challenges are overcome by the open architecture approach and greater freedom for innovation and competitive choice. Appropriate incentives on the relevant parties to procure and provide solutions that maximize customer access and participation are envisaged.

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?

No H1 interface is envisaged

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**.**

No H1 interface is envisaged.

5.3 What physical interface and communication standards are or will be used on the H2 interface?

All relevant standards will be included in the smart metering procurement. The H2 interface is still to be concluded, but it will be an open standard solution.

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**.**

There will be a published H2 "Home Area Network" guide against which device manufacturers can design Supplier or 3rd Party required devices.

5.5 What physical interface and communication standards are or will be used on the H3 interface?

No H3 interface is envisaged.

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**. [**
No H3 interface is envisaged

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?

The NSMP will not be specifying alternative interfaces.

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**. The NSMP has not to date identified alternative interfaces. These are free to be determined by the party providing the additional service features to the customer.**

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software).

The NSMP design is intended to provide for flexibility of design for new services without recourse to infrastructure upgrades. Meters will permit firmware upgrades, but it is expected that all such changes will be kept to a minimum and meter specific hardware changes should only be required in accordance with industry certification requirements (with the possible exception of gas meter batteries). It is envisaged that new consumer related functionalities will be accommodated through the innovative space of devices within the home.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing)

The smart metering system is provided by the sole Electricity DSO on behalf of all electricity suppliers and the Gas Networks Operator. Interoperability of meters and the chosen communications solution will be provided for by the specification of open standards to be determined in the procurement exercise due to commence later in 2015, intended to ensure a choice of alternate meter manufacturers. The H2 HAN interface will be an open standard and will be published in a HAN specification document.

Q. Is any interoperability testing or certification foreseen for the H1 interface?

A**. H1 interface is not applicable. We expect the H2 interface testing and certification to be determined by the DSO Party procuring the technical solution.**

8. Italy

Identification

G. Member State: **ITALY**
H. Organization (who filled in this questionnaire):
I. Name: ENEL DISTRIBUZIONE
J. Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions:
  a. Massimo Briccola
  b. massimo.briccola@enel.com
  c. +390221091988
K. Type: **ELECTRICITY DISTRIBUTION COMPANY**
L. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **the most part of Italian geographical area**
M. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: ABOUT 85% OF DISTRIBUTION CUSTOMERS**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   ENEL has developed a solution to provide information of consumption directly to the customer. It is a gateway that connects to the smart metering system through the PLC interface and provide an USB port where the customer can connect a computer or a display and access the information by using an application. However, the use of this gateway is not yet regulated by the Italian regulator.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
This gateway has been developed in a later upgrade of the system.

1.2 Will the information provided to the consumer be free of charge? **[Yes]**
If not provided free of charge, what is the business model (e.g. charging model)?
At the moment, where the gateway is delivered for financed projects, the information is provided free of charge.

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   The solution indicated in the previous answer is able to update the information provided to the customer within the recommended 15 minutes.

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   This gateway has been developed in a later upgrade of the system.

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].
   The information is updated every 10 minutes, in line with the recommended 15 minutes. The frequency can vary, (e.g. in order to prevent overload) and the limit is 3 minutes.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   The smart meters that are deployed by ENEL already include up to 4 tariff bands, time of use registers and remote tariff configuration
   Functionality f) is thus supported.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   This functionality is in place since initial implementation.

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
   Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)		X		X
b)		X		

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   No interface H1 is implemented or foreseen.

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   H2 interface is implemented through the use of a PLC gateway that allows the customer to access its consumption information. It has been implemented in a later upgrade.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

No interface H3 is implemented or foreseen.

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?

ENEL developed a web portal for MV customers that allow them to visualize and download the detailed consumption information. ENEL developed the web portal for LV customers, who can visualize the monthly readings of the last 12 months.

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces?

Since the implementation of local interfaces to fulfill functionality a) and b) is based on PLC interface, there is a technical issue related to noise because of potential emissions within the CENELEC A frequency band, used by the PLC communications, due to customer devices. This issue needs a regulatory solution.

Another challenge of the implementation of the H2 interface is that corresponding gateways or devices need to be installed on the customer premises, within its electrical installation.

If yes, how is solving of these challenges or barriers foreseen?

The issue on the emissions within the CENELEC A frequency band requires a solution at International/European level, and is currently being treated within the IEC SC77A Technical Committee.

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?

The implementation of the H1 interface is not foreseen

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**.**

N/A

5.3 What physical interface and communication standards are or will be used on the H2 interface?

The gateway connects to the smart metering system through the PLC interface and provide both a wired interface through an USB port where the customer can connect a computer or a display and access the information by using an application, and a wireless interface through a dongle (wifi and ZigBee).

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**.**

The customer needs the gateway supplied by DSO to access the smart meter on the H2 interface. This interface is not based on a specific standard, but it is open..

5.5 What physical interface and communication standards are or will be used on the H3 interface?

No H3 interface is currently foreseen

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.**

No H3 interface is currently foreseen.

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?

HTTPS standards is used for the web portal.

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**.**

N/A.

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)

ENEL DISTRIBUZIONE smart metering system is scalable and supports remote firmware update, what will allow for future upgrades of functionalities.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing)

The use of USB port and WIFI guarantee the communication with the customer's devices through standardized interfaces.

9. Latvia

Identification

A. Member State: **[Latvia]**
B. Organization (who filled in this questionnaire): **Sadales Tikls AS**
   Name: [**Ivo Grinbergs]**
   Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: **[Ivo Grinbergs / ivo.grinbergs@sadalestikls.lv/ +371 67728506]**
   Type: **[DSO]**
C. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **[responsible for the roll-out of Smart Meters in all territory of Latvia]**
D. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: [100%]**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes, hourly consumption profiles for previous day via AS "Sadales tikls" web portal www.e-st.lv]

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial with possible later upgrades. Clients equipped with smart meters can access their load profiles in web site]

1.2 Will the information provided to the consumer be free of charge? **[Yes]**
   If not provided free of charge, what is the business model (e.g. charging model)?

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [No. No market demand for more frequent readings]
   Update 29/7/15 (V1.1): Functionality (b) is implemented but disabled. Will only be enabled when a consumer requests to have this functionality.

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Yes, once upon customer request]

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? **[daily update for data in web portal - 1 hour profile for previous day].**

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
[Yes in general, except advanced tariff structures which are provided by retailers]
Update 29/7/15 (V1.1): functionality is implemented but limited to 4 tariff zones

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[currently not planned]

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)	-	-	-	-
b)	-	-	-	-

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[It is tested, but no customer interest] – there are well developed broadband internet in Latvia that allows customers to monitor their consumption and market prices instead of in-home displays solution
Update 29/7/2015 (V1.1): H1 is under development, limited to Mbus interface for existing meters. It will only be enabled when a consumer requests to have this interface.

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **[currently not planned]**

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **[currently not planned]**

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades? **[DSO and/or retailer web portal]**

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? **[no]**
If yes, how is solving of these challenges or barriers foreseen?
[…]

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface? **[n/a].**

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**. [n/a]**

5.3 What physical interface and communication standards are or will be used on the H2 interface? **[n/a].**

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**. [n/a]**

5.5 What physical interface and communication standards are or will be used on the H3 interface? **[n/a].**

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**. [n/a]**

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)? **[n/a].**

5.8 5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**. [n/a]**

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? **[Yes]** Please explain what elements of the infrastructure are upgradable (hardware and software) **[Hardware: possibility in future to switch to LTE mobile communication technology to ensure high performance data retrieval from point-to-point meters enabling a) functionality. Software: Possibility to make necessary changes in meter data collection system and web portal to ensure high performance data representation for a) functionality]**

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing) **[Our vision is to implement mainstream technologies and specifications widely used in European market]**.

10. Luxembourg

IDENTIFICATION

N. Member State: **Luxembourg**
O. Organization (who filled in this questionnaire):
P. Name: **Luxmetering G.I.E**
Q. Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions:

Name: Hoffmann Paul
Email: paul.hoffmann@luxmetering.lu/
Phone: +352 284868-1

R. Type: **Economic interest group of the 7 gas & electricity DSO's of Luxembourg**
S. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **Luxmetering is responsible for the implementation and the coordination of the roll-out of the Smart Metering system for the whole country.**
T. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: 0%, all field equipment will be rolled out by the different DSO's.**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

The Luxmetering project started beginning 2015 and is now in the design phase. The electricity and gas rollout is planned for 1/7/2016.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

Yes, a) functionalities are all foreseen in the design:

a. **The e-meter will act as the local customer gateway. It collects the metering data of connected M-Bus devices (gas, water & district heat) on an hourly basis and stores the data for 3 month in the e-meter.**
b. A unidirectional interface according to DSMR 4.2.1 standard will allow streaming of electricity, gas, water & district heat data to a remote display or an in-home server.
c. The e-meter data is transferred via data concentrators in the field or via direct GPRS communication to the central system, which validates the data and sends them at least once a day to the concerned DSO's, who forward them directly to the concerned suppliers.
d. **According to Luxemburgish law, suppliers are in charge of providing the consumption information to their customers. As the suppliers will receive**

the 1/4h resp. 1h values every day, they may provide on demand a daily summary to their customers through one or more communication channels and will be free to add tariff information

U. Functionality b)

a. The customer unidirectional P1 port according to DSMR 4.2.1 provides streaming of consumption data up to every 2-10 seconds. Streamed information will include near real-time e-meter data, as well as 15 min data for gas, water and district heat. Connection to an in-house energy server (with smart phone application) is possible through a DSMR 4.2.1 converter proposed by different vendors. Price information has to be provided by the customer supplier.

V. Functionality f)

a. As 15min (electricity) resp. 1h index values (gas, water, district heat) are provided to all DSO's and suppliers on a daily basis, the DSO and suppliers will have a greatest flexibility in designing advanced tariff systems.

b. **As the electricity meter also includes 2 relays, demand side management will be available for electricity, gas, water or district heat.**

c. **Tariffs themselves will not be stored in the meters**.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

All functionalities will be included in the initial implementation, starting 1/7/2016. However, there will be no rollout for a remote display nor for in-home energy servers as we believe that this market will only develop during the next years either by suppliers or independent energy consultants. As detailed metering data is forwarded on a daily basis to DSO's and suppliers, they will be able to provide this data to their customers via different communication channels.

1.2 Will the information provided to the consumer be free of charge? **[Yes/No]**

If not provided free of charge, what is the business model (e.g. charging model)?

Yes. The provision of data through local P1 port is free of charge. However there might be charges for remote displays or energy servers to be installed by a third party.

Suppliers have to provide detailed data free of charge and on a frequency high enough for customers to control their consumption.

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

Yes. Please see 1., 1.1., and 1.2.

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

Initial implementation

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].

Every 2-10 s for electricity through the local port. Every 15 minutes for gas, water and heat through the local port. This frequency cannot be changed.

Daily detailed 1/4h resp. 1h from the previous day to the supplier. This provisioning frequency can only be changed for meters in prepayment-mode (provisioning granularity will still be ¼h resp. 1h).

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

Yes. Please see 1.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

Initial implementation.

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?

Please cross the cells in the following table

Energy Management gateway is included in e-meter. H1, H2 and H3 functionalities are included in P1 port = end consumer port.

Interface Functionality	H1	H2	H3	Other
a) - Direct readings to customer through H1	X	X	NA	
b) - Direct readings to customer through H1 - History data available through remote display or energy server	X	X	NA	

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

Initial implementation

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

H2 is integrated in the same P1 port as H1

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

NA

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?
No

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces?
No
If yes, how is solving of these challenges or barriers foreseen?
NA

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?
H1 interface is based on the Dutch standard DSMR 4.2.1, which is based on IEC 62056-212. It will allow data transfer as well as message transfer. For enhanced security, all communications will be encrypted AES-128, with further enhancements possible through firmware update.

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**.**
A companion for P1 will be elaborated during the project, which will allow remote displays or energy servers to be connected to the P1 port

5.3 What physical interface and communication standards are or will be used on the H2 interface?
See 5.1.

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**.**
See 5.2.

5.5 What physical interface and communication standards are or will be used on the H3 interface?
NA

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.**
NA

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?
NA

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**. NA**

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)

Yes. The firmware of all meters is upgradable in order to cover further functionalities and to enhance security.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing).

Interoperability will be ensured and maintained through standardized PLC G3 alliance, IDIS (electricity meter data model) and OMS (for M-Bus communication between e-meters and gas, water & district heat meters) interoperability tests.

11. Malta

A. Member State: **MALTA**

B. Organization (who filled in this questionnaire):

- Name: **ENEMALTA plc**

- Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions:
  - **Ing Carmel Xerri**
  - **Carmel.xerri@enemalta.com.mt**
  - **0035622980439**

- Type: **ELECTRICITY DISTRIBUTION COMPANY**

C. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **Fully responsible**

D. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: 100%**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realized, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

Functionality (a) in ENEMALTA is fulfilled through a web page.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

Later upgrade of the system.

1.2 Will the information provided to the consumer be free of charge?

Yes

If not provided free of charge, what is the business model (e.g. charging model)?

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

ENEMALTA will be evaluating and considering a pilot project to test a solution to provide information of consumption directly to the consumer through a gateway that connects to the smart metering system using the PLC interface and provide interface towards the home devices and displays.

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

Later upgrade..

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].

The information would be updated every 10 minutes, in line with the recommended 15 minutes, though the final features will depend on the results of the pilot project.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

The smart meters deployed by ENEMALTA include up to 4 tariff bands, time of use registers and remote tariff configuration.

Functionality f) is thus supported.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

This functionality is in place since initial implementation.

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?

Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)		X		X
b)		X		

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

No interface H1 is implemented or foreseen.

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

H2 interface is foreseen through the use of a PLC gateway that allows the customer to access its consumption information. It will be implemented in a later upgrade.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

No interface H3 is implemented or foreseen.

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?

ENEMALTA is developing a web portal. When launched this will have the following features: easy access to consumer profile, almost direct access to billing information, access to utility services from home, downloadable applications, consumption calculations, meter on line services, payments on line, service interruptions, payments, bills, my contracts etc.

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces?
Since the implementation of local interfaces will be based on PLC interface, there could be technical issues related to noise because of potential emissions within the CENELEC A frequency band, used by the PLC communications, due to customer devices.

Another challenge of the implementation of the H2 interface is that corresponding gateways or devices will need to be installed on the customer premises.

If yes, how is solving of these challenges or barriers foreseen?
The issue on the emissions within the CENELEC A frequency band requires a solution at International/European level, and is currently being treated within the IEC SC77A Technical Committee.

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?
The implementation of the H1 interface is not foreseen

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents.
N/A

5.3 What physical interface and communication standards are or will be used on the H2 interface?
The gateway will connect to the smart metering system through the PLC interface and will provide both a wired interface through an USB port, or a wireless interface through a dongle (WiFi and ZigBee).

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents.
The customer will need the gateway supplied by DSO to access the smart meter on the H2 interface. In case of Zigbee this interface will be based on Home Automation 1.2 profile. **In any case the protocol between the gateway and the in home application will be an open solution.**

5.5 What physical interface and communication standards are or will be used on the H3 interface?

No H3 interface is currently foreseen

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents.
No H3 interface is currently foreseen.

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?
HTTPS standards is used for the web portal.

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents.
N/A.

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)
ENEMALTA smart metering system is scalable and supports remote firmware update, what will allow for future upgrades of functionalities.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing)
The use of USB port and WIFI will guarantee the communication with the customer's devices through standardized interfaces.

12. Netherlands

Identification

A. Member State: **Netherlands**
B. Organization (who filled in this questionnaire): **Netbeheer Netherlands**
   Name: **PGASM, WG DSMR**
   Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: **Leo Kramp / leo.kramp@stedinmeetbedrijf.nl / +31 6 30000210]**
   Type: **[Combined Dutch DSO in Branch association Netbeheer Nederland**
C. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **N/A**
D. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: N/A**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented? **Yes.**

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
In the initial implementation. For DSMR4.0 the P1 port was changed (Higher datarate, powered port, added checksum, extra information in the telegram) to meet customer expectations. For the next generation (DSMR5.0) the main change will be the higher frequency (every second) and a higher refresh interval for M-Bus (i.e. gas meter) reading to once every 5 minutes.
Update 29/7/15 (V1.1): Next generation meters which will be deployed from mid 2016 – 2020 will have frequency: E: every second and G: every 5 minutes

1.2 Will the information provided to the consumer be free of charge? **[Yes/No]**
If not provided free of charge, what is the business model (e.g. charging model)?
Yes. The information made available locally via the P1 port (Consumer interface) is free of charge

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

Yes. The information on the P1 port is updated every 10 seconds, gas readings once an hour. In the next generation (DSMR5) this will be every second and the gas meter value will be updated every 5 minutes. Consumers can also have access to consumption information via the Head-End and backoffice systems of the DSO. On system level (Head-end) the data for electricity is stored in a 15-minute load profile, for gas meters this is a 1 hour load profile. The possibility (and frequency) to retrieve these data by market parties is depending on the mandate the customer has given.

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
Initial

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes]. **See answer to question 2**

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
Yes, Low and High Tariff has been implemented

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
Initial. We implemented some options to increase this if needed for TOU purposes.

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
Primary function: Dutch P1 Interface (Consumer Interface)	**x**			
Expanded function* : Dutch P1 Interface (Consumer Interface)		**x**	**x**	

*** The P1 is a port that can be expanded to multiple physical connections by means of a P1 hub. Thus enabling use for P1 display, but at the same time also for (unidirectional) H2/H3 purposes.**

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Initial**

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
H2 is not implemented in the Dutch Smart Meter Architecture as a separate port, there are no plans to do so. As stated in answer 4 it is possible to use the (unidirectional) P1 port also for LNAP / NNAP purposes

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

H3 is not implemented in the Dutch Smart Meter Architecture as a separate port, there are no plans to do so As stated in answer 4 it is possible to use the (unidirectional) P1 port also for LNAP / NNAP purposes

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades? **No, The P1 (H1) Port is the only interface available. Strictly you can look at the P2 port as defined in the DSMR as another interface in that sense that it provides the data of M-Bus devices (e.g. Gas meter, water meter, Heat/cold meter, second E-meter) to the E-meter and thus to the P1 device of the customer.**

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces?
If yes, how is solving of these challenges or barriers foreseen? **No,**

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?

H1 interface (P1) is based on IEC 62056-21

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**.**
DSMR4.2 P1 Companion Standard for current meters / DSMR5.0 P1 Companion Standard for next generation

5.3 What physical interface and communication standards are or will be used on the H2 interface? **Not Applicable**

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**.**
Not Applicable

5.5 What physical interface and communication standards are or will be used on the H3 interface? **Not Applicable**

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.**
Not Applicable

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?
Not Applicable

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**. Not Applicable**

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future?

Yes, The Non Legal Relevant part of the smart E-meter firmware is remote updatable. In the next generation it will also be possible to update the Non Legal Relevant part of the smart G-meter firmware

5.10 What measures are planned to ensure that interoperability is achieved and maintained?

By means of extensive testing during development and testing of new devices and (regression) testing in case of new firmware versions.

Update 29/7/15 (V1.1): based on DSMR3.0/4.x/5.0 Companion standards (Updated per smart meter generation based on lesson's learned and market requests).

13. Poland

Update 29/7/15 (V1.1): in the main report a text update has been provided by Poland, following the initial input from Poland below.

Identification

C. Member State: **POLAND**
D. Organization (who filled in this questionnaire):
- Name: **Energy Regulatory Office**
- Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions:
  Tomasz Kowalak / tomasz.kowalak@ure.gov.pl/ mobile:+48 601252686]

- Type:
  regulator

E. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area:

responsibility is related to all territory of Poland , but it is partly because of the main role of the Ministry of Economy. According to the Polish law, Ministry of Economy is the "main regulator" because of his legislation initiative. The process of massive roll'out depend of the political and legal decision of MoE and the Parliament. President of ERO is the "small regulator". He is the "ranger" of the laws set by Parliament and MoE only. DOS's are responsible for the practical execution of law. They can prepare local initiatives additionally.

F. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**:**

not applicable (see above). In Poland 5 main DSO's are active: Energa- operator SA, TAURON dystrybucja, and RWE Stoen Operator SP z.o.o., ENEA and PGE. All of the smart meter implementations are individual, there are no not coordinated initiatives.

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   Yes, but partly: on demand of the customer only. There is prepared proposal of non-formal (without legal base) requirements for smart meters, described as "Polish Recommended Specification". It will be published on the web site of ERO as a product

of cooperation with energy business. According this requirement, the meter with interconnector necessary for communication between meter and home appliances will be installed on demand customer only,

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

All options: initial, later upgrades, next roll out + planning. It depends on the certain area (DSO) and stage of the roll-out. Because of lack of uniform shape of meter architecture, it depend of the certain project. It means it depend on the certain DSO.

1.2 Will the information provided to the consumer be free of charge?

Yes, but the implementation of the channel of communication (interface in the Smart Meter) will be charged as an special order of customer (see point 1.) Information transmission will be free of charge, but device needed to this process (meter with dedicated interconnector) will be charged by customer

If not provided free of charge, what is the business model (e.g. charging model)?

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

Yes. It will be implemented by the same approach like functionality a (this same device and roles). According to the Polish Recommended Specification the simple Home Display is the alternative for HAN Commander and the source of information from the Smart Meter side is the same. There is not provided parallel flow of information to the Display and to the HAN Commander.

Unfortunately the Polish Recommended specification it is in Polish only, yet. The Specification will be not "Recommended" because of lack of standardization of communication layer in this description. The constraints between certain DSO's business strategies was to strong and the power of ERO too weak to solve this problem.

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

Like point 1.1.

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].

Every 10s, it could be changed between 10s and 60s.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

On the level of Smart Meter – yes

On the level of legislation and market roles – not yet.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

Yes, but in the small scale, in the frame of dedicated pilots only .Actual planning has been stopped because of the short perspective of parliamentary elections

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
   Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)	+		-	-
b)			-	-

As described above, functionalities a) and b) will be realized by one common interface on the level of the Meter (H1/H2). It is Port USB 1.1. The difference of status: H1 or H2 it depend on the device connected to the interface – it will be the "oversea" part of Simply Home Display or of HAN Commander.

According to the polish concept of HAN, there is two possibilities:

- **simply display and nothing more at home or**
- **gateway, HAN Commander and active home appliances (battery, source or control receivers).**

The device connected to the meter should be operate one only scenario and, from the communication point of view, should be a part (complete) of the display or gateway. But the interface on the side of meter should be uniform, for both possibilities, described in the UE documents as H1 and H2

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

It depend on the certain DSO (se point 1.1.)

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

See above.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

There is no perspective for implementation interface H3 or other local interfaces. The information useful for the customer's current energy management is on the top level of sensitivity. So there is no perspective for it transfer outside Smart Meter by the DSO infrastructure. Only direct link to the customer's equipment, on the basis of the customer order is acceptable, for Inspector General point of view. DSO's retrieve the data via an own interface (PLC based). There are two reasons of this solution:

The first is: security of the metering data. According the Polish law the possibility does not exist of disconnecting of the customer from stopping transfer of data, so DSO's are looking for solution independent of HAN for transmission of data needed to settlement,

The second is: security of data from privacy of customer view. The transmission of data from meter to HAN (needed for improving of efficiency, for example) it is voluntary process – the result of the free decision of customer and security of this data is in his area of responsibility.

The transmission of data from meter to DSO (for settlement) it is obligatory process and responsibility of safety of this process depend on the DSO. It will be unproper to intrude DSO, according to law, to the HAN organization. The site of DSO and the site of HAN it will be absolutely independent "worlds". The Polish proposal is the solution to this problem

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades? **No. See above.**

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? **Yes**

If yes, how is solving of these challenges or barriers foreseen?

There is lack of political (legal) decision related to the massive roll-out, flexible tariff structure and standardization of devices. The process is stopped because of the short perspective of the parliamentary elections.

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?
USB 1.1.

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**.**
There is prepared companion standard: the Recommended Specification of AMI devices, developed by DSO and ICT representation. This specification is in Polish only yet, as described above. It is common for all DSO's, but it permits individual solutions for certain DSOs in the communication layer. So, this Specification is not a "Standard" yet and as a result interoperability within Poland is not guaranteed.

5.3 What physical interface and communication standards are or will be used on the H2 interface?
USB 1.1.

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**.**
See above (point 5.2.)

5.5 What physical interface and communication standards are or will be used on the H3 interface?
Not applicable (see point 4.3.)

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.**

Not applicable.

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?
Not applicable.

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**. Not applicable.**

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? **Yes**
Please explain what elements of the infrastructure are upgradable (hardware and software)

According to the Recommended Specification mentioned above there is requirement of fully upgradable software without any change of hardware. But this requirement is facultative yet.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing) [open answer].
There is planned the organizational structure for conformance setting and testing of devices implemented to the AMI. The responsibility for this lies with the Ministry of economic affairs but Because of an informal political decision "massive rollout is not yet decided; the traditional reinforcement of grid is needed first", the timeline of this process there is not settled yet.

<u>General summary:</u>

The decision for a large scale roll out in Poland has not been taken yet by the ministry of economic affairs, because of a "negative impact on the social environment".
It is not clear when this decision will be made, as elections will be held this year.

DSO's are having pilots but there is no agreed complete common specification of requirements for the meters. There was no agreement on the communication interfaces, so today each DSO is free to implement its own specification. As a result no interoperability within Poland is guaranteed. The regulatory office has not been able to improve this situation because of lack of power. As a consequence this may lead to 1.5 Million stranded assets (meters) by end of 2017

RWE Stoen Operator Sp. z o.o.

Identification

E. Member State: **Poland**
F. Organization:
- Name: **RWE Stoen Operator Sp. z o.o.**
- Contact person: **Małgorzata Cybulska,** Malgorzata.Cybulska@rwe.pl**, tel. 0048 608-428-596**
- Type: **DSO, RWE Stoen Operator Sp. z o.o.**

G. Parts or geographical area: **Warsaw urban area**
H. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: 6% of the # connections (100% in Poland is approx. 14 Mio connections Residential & SME)**

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

Currently RWE Stoen Operator is running the pilot smart metering project „Real Dimension of Energy". The project consists of installation of 100 000 smart meters in one of the district of Warsaw, building the system of data acquisition and interfaces to other market participants for profile data sharing. Technology of communication is PLC.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   Yes. In Poland all DSO's and Energy Regulatory Office agreed that Retail companies are responsible for providing complex information concerning energy usage to the customers. DSO will provide technical solutions such as HAN interface and profile data interface on a centralized system (not on the meters) to energy market. Additionally, profile data can be provided via this centralized system interface to other energy market participants. Retail companies can offer consumers dedicated products, web portals, applications and devices such as Home Displays in order to monitor energy usage in "real time".

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
Technical solution present in initial implementation and is based on Mbus wireless as this technology was one of present solutions at the time of the tender. Target solution in common specification prepared by DSOs and the Regulator is USB port.

1.2 Will the information provided to the consumer be free of charge?
If not provided free of charge, what is the business model (e.g. charging model)?
It depends on Retail companies products and offers as included in the subscription.

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
Yes. Technical solutions are implemented.

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
Solution is provided in initial implementation. However, it has been agreed that Retail companies are responsible for the communication with the energy consumers concerning demand side commands. DSO will provide technical solutions and provide reports to Retail companies.

2.2 What is the frequency of the information provision to consumers?
Port HAN updates the information on the display every 15 seconds.
Can this frequency be changed? **No.**
If yes what are the limits? **Every 15 second if Mbus is used.**

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
Yes, partly. Technical solutions are implemented for advance tariff structures, time-of-use register, but not online remote tariff control. Tariff can be changed only at midnight.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
Products are not implemented yet. Such products as dynamic tariffs have not yet been implemented in Warsaw area.

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)	X			Profile data interface from Meter Data Management system to energy market
b)	X			Profile data interface from Meter Data Management system to energy market

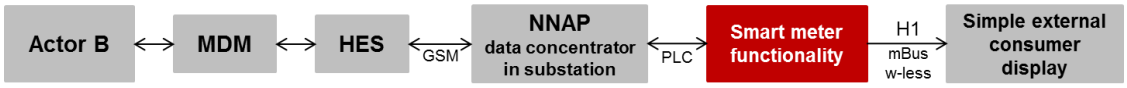
4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
The interface is implemented.

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

No such plans yet.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
No such plans yet.

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?
There is only one local interface H1, described in the diagram below:



The current solution of data gathering frequency is 15-minutes profiles for small and medium enterprises and 60-minutes profiles for households. Final solution is ready to gather 15-minutes profile data from all devices.

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces?
Yes.
If yes, how is solving of these challenges or barriers foreseen?
Technically, it is difficult and increases the unit cost of the meter. There is Regulatory and security challenge concerning responsibility for energy usage data management between DSO and Retail companies (Retail companies need individual permission of consumer to manage such data).Meter vendors state that complying to the H1 and H2 interfaces would require a redesign of their meters which increases costs and as they are not sure whether this leads to revenue in the future, they don not move on this from themselves.

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?
CEN-CENELEC. No further information yet.

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents.
Representatives of energy companies are currently working on further assumptions on companion standards for Poland. There is a common document currently under consultation within all Polish DSO's, but as of lacking clear guidance from the Regulator and Min of Economic affairs the future status of this document is not clear.

5.3 What physical interface and communication standards are or will be used on the H2 interface? **Not applicable. No such interface.**

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents.
Not applicable. No such interface.

5.5 What physical interface and communication standards are or will be used on the H3 interface?
Not applicable. No such interface.

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.**
Not applicable. No such interface.

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?
Not applicable. No other interfaces.

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**.**
Not applicable. No such companion standards.

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? **Yes.**
Please explain what elements of the infrastructure are upgradable (hardware and software) **Currently RWE provides only software update.**

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing)
Energy Regulatory Office statement on the interoperability, which contains the basic assumptions. Representatives of energy companies are currently working on further assumptions on companion standards for Poland. Interoperability is defined as the solutions that provide the same data model and equal interfaces and has to be confirmed by testing.

Ministry of Ec. Affairs and the regulatory office are responsible here, however:

- **Today:**
  - **there is no official law that obliges DSOs to roll out of smart meters in Poland**
  - **There has been the incentive mechanism but Regulator suspended the incentive mechanism for smart metering investments in the beginning of 2015**
  - **The status of the document of common requirements for the meters is under consultation and it is not clear**
- **Up until today there was only an advice to DSO to do pilots, which are based on what is available on the market**
- **Poland decided to roll out smart meters using PLC, but different standards for PLC exist, their performance depends on the grid and the newest standards still need testing**

- **As a consequence no interoperability on the H1 interface in Poland between the different DSO's can be guaranteed today**

TAURON

Identification

G. Member State: [**Poland]**
H. Organization (who filled in this questionnaire):
- Name: [**TAURON Dystrybucja S.A.**]
- Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: **[Mariusz Jurczyk / mariusz.jurczyk@tauron-dystrybucja.pl / +48 516 113 490]**
- Type: **[DSO]**

I. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **[I am fully responsible, requirements for the smart metering have been implemented according to Polish Regulator Smart Metering positions]**
As the specification, document from the regulatory office has not been published and agreed as a final version of specification. Today, every DSO have to agree a technical specification with regulatory office.

J. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: [~33%,** representing appr. 5.3 million connections]

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

[TAURON has deployed about 40 000 smart meters. The main installations are:

- **2011 year: IDIS PLC Project (main contractor Landis+Gyr), about 11 000 meter points, full interoperability – meters from Landis+Gyr, Iskraemeco, Itron**
- **2012 year: DCSK PLC Project (main contractor Apator), about 21 000 meter points, meters only from Apator**
- **2013 year: PRIME PLC Project (main contractor SagemCom), about 3 500 meters points, full interoperability – meters from SagemCom, ZIV**
- **2014 year until 2017: OSGP PLC Project AMIplus Smart City Wroclaw (main subcontractor NES, APATOR), about 330 000 meter points, full interoperability – meters from NES, APATOR**
- Some of these projects have been approved by the regulatory office (CAPEX was granted)

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
[YES. Meters in above projects has some typical interfaces like: wired m-Bus, wireless m-Bus, RS485. Information about energy consumption for every customer are available

on dedicated platform TAURON e-Licznik. This platform includes web site, application on smartfon for platform iOS, Android, Windows Phone]. TAURON did not decide for USB port interface because of technical , security and cost aspects.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Above projects are pilots. We are planning to use experiences from this installation for next rollout installation. Currently, DSO have not started mass rollout. Current project AMIplus Smart City Wroclaw has checked all the procedures necessary on next roll out] End 2017 TAURON will have rolled out approx. 370k smart meters (in pilots)

1.2 Will the information provided to the consumer be free of charge? **[Yes, information are free of charge]. Today there are not yet Displays or HAN gateways in the market able to connect with the H1 interface of TAURON. Tauron is considering as a first step to set up a demo center.**
If not provided free of charge, what is the business model (e.g. charging model)?

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
[Partly. Meters in above projects has some typical interfaces like: wired m-Bus, wireless m-Bus, RS485, but our clients don't use it. On that interface, data are available the frequency from minutes to 15 minutes. Besides, information about energy consumption for every customer are available on centralized dedicated platform TAURON e-Licznik. This platform includes data on 60 minutes interval. Data are available today for yesterday.]

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Above projects are pilots. We are planning to use experiences from this installation for next rollout installation, so the answer to this question is still open].

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].
[In current project AMIplus Smart City Wroclaw, meters has interface wireless m-Bus. On interface, frequency is remotely or locally programmable, in the range of from 10 seconds to 1 minute, with a resolution of 10 sec]

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
[Yes, functionality concerning different tariffs are implemented]

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[Above projects are pilots. We are planning to use experiences from this installation for next rollout installation, so the answer to this question is still open]

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
   Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)	X	X		
b)	X	X		

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[AMIplus Smart City Wroclaw is the biggest project, but still pilot. We are planning to use experiences from this installation, based on wireless m-Bus, for next rollout installation]

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[AMIplus Smart City Wroclaw is the biggest project, but still pilot. We are planning to use experiences from this installation, based on wireless m-Bus, for next rollout installation]

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[We don't plan to use this interface]

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades? **[No]**

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces?
If yes, how is solving of these challenges or barriers foreseen?
[Yes, no agreement in Poland on the H1 interface and no standard officially published. Technically, as the H1 and H2 interface represent the same one interface on the meter they cannot be operated simultaneously in parallel]

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?

[On current project, AMIplus Smart City Wroclaw, we use wireless m-Bus interface, according to EN 13757-4, common for H1 and H2]

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**.** **[We use wireless m-Bus specification, based on Polish version of document EN 13757-4]**

5.3 What physical interface and communication standards are or will be used on the H2 interface?

[On current project, AMIplus Smart City Wroclaw, we use wireless m-Bus interface, according to EN 13757-4, common for H1 and H2]

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**.** **[We use wireless m-Bus specification, based on Polish version of document EN 13757-4]**

5.5 What physical interface and communication standards are or will be used on the H3 interface? **[We don't use H3 interface].**

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.** **[We don't use H3 interface]**

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?

[It is not applicable].

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**. [It is not applicable]**

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)

[On current project, AMIplus Smart City Wroclaw, elements of infrastructure are upgradable – mainly software part. Hardware could be upgradable in limited extent, it depends from the range]

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing) [open answer].

[Current project AMIplus Smart City Wroclaw, fully supported interoperability. Communication standard on PLC based on OSGP specification, meters from two vendors are installed on the LV grid, meters are mixed on the grid. For interface wireless m-Bus, details specification based on norm EN 13757-4, are available for HAN Gateway producers. It guarantee interoperability within TAURON]

Within Poland as a whole there are no plans yet that lead to guaranteed interoperability between DSO's, as today there does not exist a formally published requirement specification which is agreed by all DSO's and published by the Regulatory Office

ENERGA

I. Member State: **Poland**
J. Organization (who filled in this questionnaire):
- Name: **ENERGA-OPERATOR SA**
- Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: **Maciej Głombiowski / maciej.glombiowski@energa.pl / +48785887675**
- Type: **DSO**

K. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **Northern and Central Poland (about 75 thousand square kilometers)**
L. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: about 24% territory of Poland; Polish energy distribution market share – 17%**

(# of connections ?)
It is a percent of the energy market share in the whole country.

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

AMI – In this Smart Metering project there have already been installed more than 400 000 meters and now is being installed on the grid 450 000 meters more, so at the end of the year 2017 there will be 850 000 meters installed. (2011-2017).

Others Smart Grid projects:

- Smart Grid Road Map 2030 - Based on the analysis of economic and technical development of smart grid deployment strategies in the EOP (10.2012-12.2014)

- Smart Toruń - project includes the development of an application to remote communicate with meters and the preparation of special systems for the operation and management of the network. (10.2013-03.2015)

- The Smart Peninsula – The main aim of the projects was to provide a basis for the introduction of the existing distribution network elements that will allow to rebuild it to the Smart Grid level. (2011-2013)

- Panel studies Kalisz (behavioural studies) – testing the ability of customers to reduce energy consumption and use it in the selected time and gain practical experience in the field of aggregate demand in the implementation of the Smart Grid. (2013-2014)

- UPGRID - innovative solutions for advanced LV grid management (1.2015-12.2017)

- Local Balancing Areas - New DSO services based on local balancing area (LOB) (2015-2017)

- Energy for saving - to verify the effectiveness of the elicitation of individual customers personalized energy reports and dedicated internet platform (2015)

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation]

   Yes - functionality has been implemented.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial, later upgrades, next roll out + planning]

   This functionality is available from the beginning of implementation. Through the firmware updates there are possible subsequent updates and customization features for the new requirements.

1.2 Will the information provided to the consumer be free of charge? [Yes/No]
   If not provided free of charge, what is the business model (e.g. charging model)?

   Distribution Network Operator is responsible for providing an interface that allows the transfer of technical information for the consumer. The provision of such services by the Distribution Network Operator in Poland is beyond the scope defined by the law of areas of its responsibility.

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation]

   Yes - functionality has been implemented.

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial, later upgrades, next roll out + planning]

   This functionality is available from the beginning of implementation. Through the firmware updates there are possible subsequent updates and customization features for the new requirements.

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].

Depending on the AMI meter series, the data can be shared every 60 or 10 seconds. At the moment we do not plan to share data more frequently than once every 10 seconds.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation]

   Yes, the implemented solution allows to promote ToU tariffs, to improve energy efficiency and the possibility of its use to reduce peak power demand.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial, later upgrades, next roll out + planning]

   This functionality is available from the beginning of implementation. Through the firmware updates there are possible subsequent updates and customization features for the new requirements.

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
   Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)	**X**	**X**	**-**	**-**
b)	**X**	**X**	**-**	**-**

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial], later upgrades, new roll-out + planning]

   This functionality is available from the beginning of implementation. Through the firmware updates there are possible subsequent updates and customization features for the new requirements.

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial], later upgrades, new roll-out + planning]

   This functionality is available from the beginning of implementation. Through the firmware updates there are possible subsequent updates and customization features for the new requirements.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Initial], later upgrades, new roll-out + planning]

We are not planning to implement H3. In our opinion, in NNAP devices there are no possibility to obtain measurement data, according to recommendations of the European Commission 2012/148/EU, with a frequency of seconds. It should be also noted that in order to protect the privacy of consumers, the measurement data obtained from the meter at a high frequency should not be processed in the infrastructure of the Distribution Network Operator (which element is NNAP), but transferred from the meter (without registration) directly to the adequate customer's infrastructure.

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades? [Provide descriptions of these interfaces: what information, what channel, what time resolution, what refresh rate, whether planned initially or through later upgrades. Clarify if possible with a diagram related to the one in Annex A]

We do not use other interfaces for consumer information provision a), b)

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? **[yes/no]**
If yes, how is solving of these challenges or barriers foreseen?
[open answer]

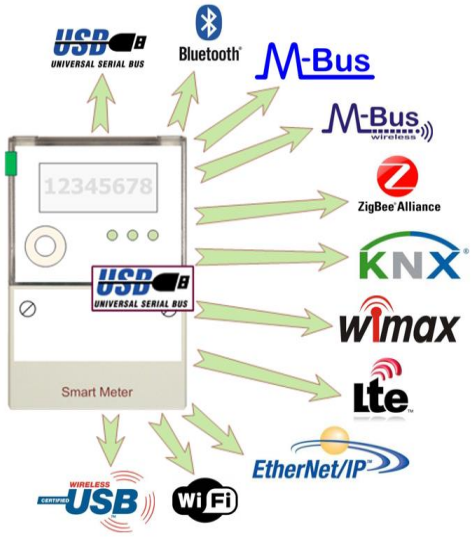
Polish law does not currently define requirements for interfaces need to use H1, H2 or H3 and the implementation of the functionality of a) and b).
Does this mean that the requirements for the H1 and H2 interfaces and data exchange have been defined by Energa themselves ? and that H1 and H2 interfaces of other Polish DSO's may have different characteristics ?
At the moment, yes. It should be added that in this area were attempts to standardize solutions in the country, but they ended in failure.

5. Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?
[CEN CENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)] [Also specify specific versions and additions that are implemented].

H1 and H2 interfaces in solution that we are using are integrated into a single physical interface, implemented as a USB port in the meter. To the USB port can be connected external adapters, to ensure the implementation of communication using techniques adapted to the specifics of a particular application or specificity of the location. Communication between the USB port and adapter connected to the USB port is

implemented using the serial port emulation techniques (Virtual Serial Port). Example of possible applications are illustrated in the following figure:



Currently, the USB port is productively used for communication (alternative to PLC) with a central IT system - via telecommunications modem connected to the USB port.

Can communication on the H1 and H2 interface be operated at the same time simultaneously (as they both are implemented on one USB interface) ?

Functionalities H1 and H2 interfaces can be implemented on a single USB port. Part of the logic of interfaces is provided by an external adapter connects to the USB port.

Are the adapters part of the DSO domain or part of the customer domain ?

We assume that adapters will be offered to consumers by energy retailers. It should be added that the adapter is connected to the USB port, which together with power supply cables meter is closed under a secure seal cover.

We have done also practical pilot projects - we have been reading other media meters (heat meters, gas meters) and made available measurement data from the counter at intervals of about 10 seconds. At this stage, the ability to support a variety of adapters connected to the USB port requires appropriate adjustment of the meter firmware.

How are these metered ?complete independent meters or is the electricity meter acting as a hub to the outside world?

For the selected meters with a USB port are connected protocol adapters that support Wireless M-BUS. The counters has been applied software that supports an adapter.

All installed in Energa Operator AMI meters are equipped with a USB port. Meters software contains the appropriate registers designed to support the M-BUS. The adapter converts the frame Wireless M-Bus and loads it into the appropriate registers in the meter. These records, as COSEM objects are impossible to read the meter via PLC communication.

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents. [open answer]

In order to ensure the interoperability, object model was complemented by the DLMS / COSEM, based on which the communication is performed using the USB port on the meter. In addition, a number of technical requirements has been developed on how to implement the USB port on the meters. The above documents we have only in Polish language.
Attachments:
- Model objects DLMS / COSEM,
- The technical requirements for the USB port on the meter.

Is there a companion standard available for vendors who develop equipment that connects to the USB (adapters) or to the adaptors (customer applications) ?

25.05.2015 The Energy Regulatory Office published on its web pages all the requirements for smart metering systems (Energa Operator has used earlier versions of published documents).

(http://ise.ure.gov.pl/ise/warsztaty-rynku-energi/ami/6170,Rekomendowane-zapisy-specyfikacji-istotnych-warunkow-zamowienia-opracowane-dla-p.html)

The documentation includes a description of communication with devices that could be attach to the USB port. It should also be emphasized that published a set of documents will not achieve the interoperability and interchangeability of devices in the country.

5.3 What physical interface and communication standards are or will be used on the H2 interface?
[CEN CENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][Also specify specific versions and additions that are implemented].
The answer is included in section 5.1.

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents. [open answer]
The answer is included in section 5.2.

5.5 What physical interface and communication standards are or will be used on the H3 interface?
[CEN CENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][Also specify specific versions and additions that are implemented].
We do not use H3 interface.

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents. [open answer]

We do not use H3 interface.

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)? [CEN CENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)] [Also specify specific versions and additions that are implemented].

We do not use alternative interfaces.

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents. [open answer]

We do not use alternative interfaces.

5.9 infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)

Development of the infrastructure in order to provide new functionalities in the future is possible by:

• upgrading meter software – it is possible to modify the scope and frequency of the information submitted and modify the communication protocol between the meter USB port and adapter connected to the USB port,

• the possibility of using different adapters plugged into the meter USB port, with the expected functionality, e.g built-in web server running on the local WiFi customer and presenting information about the current energy consumption and providing measurement information using, for example DLNA protocols for their presentation on devices: Smart TV, smartphones, tablets.

Can 2 different adaptors be connected at the same time to the USB interface ?

Theoretically, there is such a possibility. One USB device may have a socket for another USB device. In practice, however, we applied such a solution, we believe that the more technically correct direction is to integrate more functionality in a single device that connects to the USB port.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing) [open answer]

One of the possible solution is to establish an independent, national institution which will implement this type of task in the whole country. Initial discussions on this topic are conducted between the representatives of the Energy Regulatory Office, Polish Power Transmission and Distribution Association which unites Distribution System Operators and National Chamber of Commerce for Electronic Industry and Telecommunication.

What is the status of this ? and when if positively decided would this conformance test center institute be operational ?

Due to the lack of Polish law unequivocal demands implementation of smart metering, at the central level take no action known to us.

NOTE - Additional information supplied by the authorities regarding the smart metering deployment

The provisions for a large scale roll out in Poland have not been adopted yet (the relevant provisions should be adopted) and currently there is no legal obligation in place for DSOs to roll-out smart meters. The Polish Regulator holds the opinion that mass roll-out of smart meters should be postponed until 2021/2025 and preceded by introducing of smart grids. As a result, the Polish Regulator at the beginning of 2015 suspended the incentive mechanism which was used for smart metering investments.

Currently, DSOs are running pilots based on what is available on the market and for which CAPEX has been granted by the regulator. For these pilots, a further roll-out of approximately 1.1 million smart meters is foreseen between 2015 and 2017. There are neither commonly agreed communication specifications to be used for the future large-scale roll-out, nor for current deployments, and each DSO is free to implement his own specifications on the communication interfaces (H1, H2 and type of PLC standard). The common requirements published by regulatory office includes a partly provisional standard for H1/H2 (use of USB 1.1) but it is not binding for DSOs. As a result, interoperability within Poland may not be guaranteed.

Background information:

Poland requires approx. 16 Million LV smart meters, including approx. 14,5 Million for residential customers. Poland has 5 major DSOs which are responsible for meters: TAURON Dystrybucja SA, ENERGA-OPERATOR SA, RWE Stoen Operator Sp. z o.o., ENEA Operator Sp. z o.o., PGE Dystrybucja SA.

DSO	# total LV meters, contractual capacity less than 40kW	# of smart meters today
TAURON Dystrybucja SA	5360k	today 40k, end 2017 370k
ENERGA-OPERATOR SA	2931k	Today 400k, end 2017 850k
RWE Stoen Operator Sp. z o.o.	951k	100k pilot
ENEA Operator Sp. z o.o.	2448k	< 100k
PGE Dystrybucja SA	5199k	50k

Table : (source: input from Ministry of Economy and TAURON Dystrybucja SA , ENERGA-OPERATOR SA, RWE Stoen Operator Sp. z o.o., and Energy Regulatory Office)

Responses to the questionnaire were received from TAURON Dystrybucja SA, ENERGA-OPERATOR SA, RWE Stoen Operator Sp. z o.o., ENEA Operator Sp. z o.o. and the Polish Energy Regulatory Office (ERO). Additional clarification has been asked from ERO, TAURON Dystrybucja and RWE Stoen Operator. After conference calls, the response to the questionnaires have been updated and confirmed.

14. Romania

Identification

W. Member State: **ROMANIA**

X. Organization (who filled in this questionnaire):

Y. Name: **ANRE (Romanian Energy Regulatory Authority)**

Z. Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions:

Mirela Guinea / mirela.guinea@anre.ro / **0213033828**

AA. Type: **Regulator**

BB. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **NA**

CC. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: NA**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

All the answers below are the opinion of the Romanian DSOs regarding the pilot projects implementation of smart metering system. The infrastructure solution is subject to change when the roll-out decision will be made.

" The answers received (and shown in the questionnaire) from the DSOs refers only to the smart metering pilot project of 2015, which are now under development.

The implementation solutions for the 80% target (roll-out) will be decided after testing the results of the pilot projects implemented in 2015."

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented? **Yes**

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Initial**

1.2 Will the information provided to the consumer be free of charge?
Pending decision at DSO level.
Yes If not provided free of charge, what is the business model (e.g. charging model)?

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented? **Yes**

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Initial**

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].

The frequency of the information provision to consumers, as stated by the DSOs, is between 15 minutes and 60 minutes.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented? **Yes**

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Later upgrades**.

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?

Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)				
b)				

The DSOs have different approach to the metering infrastructure.

For the functionality a) most of the DSOs propose a web based access for the client or third party, at the request of the client. The platform will be continuously developed and will allow in the future, mobile data access.

For the functionality b) some of the DSOs chose to use the H2 as a local interface. When meters are installed in less accessible locations, functionality b) will be provided mainly by PLC communication. It is a technical issue related to signal interference sources caused by different noise emitters (customer equipment) in the CENELEC A band PLC. Another problem is that all devices must be linked to use a gateway. Frequency bandwidth problems require a solution CENELEC A at the International / European level.

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Later upgrades or pending decision at DSO level.**

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Initial or pending decision at DSO level.**

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Pending decision at DSO level.**

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades? **[Provide descriptions of these interfaces: what information, what channel, what time resolution, what refresh rate, whether planned initially or through later upgrades. Clarify if possible with a diagram related to the one in Annex A]**

Pending decision at DSO level.

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? **Yes.**

Technical challenges:

- the signal interference sources caused by different noise emitters (customer equipment) in the CENELEC A band PLC

- all devices must be linked to use a gateway,

- f**requency bandwidth problems require a solution CENELEC A** at the **International / European** level.

If yes, how is solving of these challenges or barriers foreseen?

Pending decision at DSO level.

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface? **Pending decision at DSO level.**

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**.**

Not available.

5.3 What physical interface and communication standards are or will be used on the H2 interface?

The DSOs who chose to implement the H2 interface, stated that the current system configuration architecture provided for the pilot project will have a PLC communication. The standards used will be those used for PLC communication between the meter and concentrator. This will most likely be the standard CLC/TS 50568-4/ -8 (SMITP).

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**.**

The extensions definition of CLC / TS 50568-4 / -8 to meter-to-gateway interface function is under discussion through Meters and More Association.

5.5 What physical interface and communication standards are or will be used on the H3 interface? **Pending decision at DSO level.**

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.**

Not available.

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?

HTTPS standards will be used for the web based access.

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**.**

Pending decision at DSO level.

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)

The implemented infrastructure is upgradeable both in terms of software and hardware. Hardware upgrades can be done punctually by replacing the old version with the new one. Upgrade versions can be performed at any level of the system: the DSO central unit command, NNAP equipment or measuring point.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing) [open answer].

Standardized interoperable communication channels are used (GSM / GPRS between the central system and NNAP, Band A PLC standard CENELEC EN 50065-1 and interoperable communication protocol (DLMS).

15. Spain

Update 29/7/15 (V1.1): in the main report additional input from the Spanish Ministry of Industry, Energy and Tourism has been included following the initial input from the Spanish DSO's below.

IBERDROLA DISTRIBUCION ELECTRICA

O. Member State: **SPAIN**
P. Organization (who filled in this questionnaire):
Q. Name: **IBERDROLA DISTRIBUCION ELECTRICA**
R. Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions:
  a. Name: **Nicolas Arcauz**
  b. E-mail**: nico.arcauz@iberdrola.es**
  c. Telephone number: **+34 944 663 331**
S. Type: **Distribution Network Operator**
T. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **Fully responsible for the fulfilment of the smart metering mandate in our geographical area, approximately 40% of the country.**
U. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: North, Central and Eastern areas of the country. In terms of responsibility, deployment of smart meters and associated smart devices, operation of the smart system and provision of consumption data to consumers and retailers.**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

   YES. Consumers and retailers received meter readings frequently enough. For those consumers equipped with a smart meter, this frequency has doubled from bi-monthly invoices to monthly invoices. For those consumers with smart meters in operation, billing exceptions and invoicing related consumer complaints have plummeted.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

   Our smart meter architecture supports frequent meter readings since conception in 2007. However, it was not until 2012 that the Government requested, by the

publication of Royal Decree 1718/2012, that consumers equipped with smart meters in operation should be invoiced monthly.

1.2 Will the information provided to the consumer be free of charge? **[Yes/No]**
If not provided free of charge, what is the business model (e.g. charging model)?
YES. Information provided to the consumer is free of charge.

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
YES. IBERDROLA DNO has developed functionality b). However, current Spanish regulation does not precisely define the term "frequently enough" as established by the Commission recommendation. We believe that the consideration "*an update rate of every 15 minutes is needed at least*" is not supported by general consensus.
So what is then the update rate?
And how has functionality b) been realised? Through a web portal?
R: Please see 2.2 and 2.4

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
This functionality was envisioned by IBERDROLA since the very beginning of the smart metering architecture definition, and is currently available to more than 4 million consumers equipped with a smart meter in operation.

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].
The frequency is whichever consumers decide, as consumers are empowered to request information at a frequency of their choice.
YES, this frequency can be changed.
Limits depend on the occupancy of the communication channels, but the average observed response time, based on hundreds of thousands of data provisions already executed, is 20 seconds. This would equal to 4,320 meter readings per day.
Is this through a web-portal? So the measurements are transferred from the meter to the web-portal every 20 seconds? If yes, how many consumers can be handled simultaneously?
Above a statement has been made that 15 minutes is too frequent. How does this relate to the 20 seconds mentioned here?
R: Yes, for the time being it is through a web portal. But meters are not currently programmed to transfer measurements at a given frequency, this is not how the architecture works. We believe that programming meters to communicate at a given frequency adds an unnecessary burden to the meter and therefore to the cost of the meter and also adds potential nasty issues. We believe that request-response is a much more elegant solution, particularly when requests are generated at random –by the customer launching an on-demand request- and therefore the likelihood of collision is minimised. Please bear in mind that if hundreds/thousands of meters are programmed

to communicate at exactly the same time and with exactly the same frequency, collisions and saturation will occur, regardless the communication media being PLC, GPRS, bluetooth, zigbee, etc. And incorporating a random seed so that meters add a random deviation to the programmed communicating times would also add complexity and cost to the meter-therefore added costs to the consumer.

The statement that "15 minutes is too frequent" does not relate to the 15 minutes itself, but to the responsibility given to the meter to communicate at a given frequency. We strongly contest that approach. And we do not recall that we were consulted on this matter, so we do not feel comfortable with the expression "by general consensus" either. It is obvious that 15 minutes may not be frequently enough if the customer wants to perform some demand-side analysis in order to observe the power demanded by certain appliances, by powering on and off those appliances. But we do not see any benefit of having the meter transferring measurements at 2:00am, then again at 2:15am, and again at 2.30am, etc. This would be totally useless for the sake of functionality (b).

The 20 seconds figure is not the lowest frequency, is the average response time that we are observing, measured since the customer issues a request to the meter until the customer receives the response from the meter and visualizes that response on the web portal interface.

With regard to how many consumers can be handled simultaneously, with thousands of requests per week we have not experienced bottlnecks so far, so theoretically there is no limit, considering that our average number of supply points per secondary substation is around 120. But we understand that massive utilisation of this service may require the reinforcement of some infrastructure at the head-end system.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   YES. The smart meters that are being rolled-out in Spain already include up to 6 tariff periods, time of use registers and remote tariff control, according to the minimum functionalities defined by Royal Decree 1110/2007.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   As said before, multiple tariff periods, time of use registers and remote tariff control are included since initial implementation.

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
   Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)			**X**	
b)			**X**	

[1]

What does Iberdrola consider to be H3? Is this the connection to a web-portal? If to what component of the AMI is H3 connected?

R: At IBERDROLA DNO we have installed a new MDM (based on Exadata by Oracle) and our existing HES has been updated to accommodate the new smart metering architecture. What sits in the middle, between our HES and our smart meters, is an IP-based network composed of thousands of smart IP nodes. Data concentrators are an example of those IP nodes, other examples are routers, gateways and a variety of telecom paraphernalia.

When a customer triggers a measurement request via web portal, that request is routed to the NNAP (therefore the H3 interface). The NNAPP or data concentrator processes the request and places it in a high priority queue, which is processed and encapsulated in a DLMS-COSEM message over PRIME PLC and sent to the meter. And the response then is sent all the way back from the meter to the web portal through the NNAP and our smart IP network. And this is the service that lasts, end to end, for 20 seconds (average response time, percentil 90).

We consciously chose not to mark "Others" and chose to mark "H3" in our reply to the questionnaire as the role of our NNAP is key for the success and speed of this service.

In summary, our H3 interface is an IP-based end-to-end interface, with one end being the customer's IP enabled device (PC, laptop, Ipad, smart-phone, etc.) and the other end being our IP-based NAPP.

NOTE: Willem, you being an expert in smart metering as you are, I am sure you can understand the huge potential of this approach. Our web portal only currently supports on-demand measurements requests from a web portal –which itself is quite unique as none of other utilities' web portals that I know of currently supports this service-. But any retailer or ESCO can bring to the market TODAY a device or an app that uses this web service and provides the customer with added functionality –such as automated and programmable requests, actions to be taken accordingly ,etc-.

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

NO. H1 interface is not implemented and it will not be implemented, as the majority of residential meters in Spain are not located in consumers' homes but in collective metering rooms, therefore making it difficult and expensive for H1 interface to be established between these metering rooms, usually located in the basement, and the consumer's home.

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

NO. H2 interface has not been implemented since the initial roll-out. We believe that H1 and H2 interfaces are not needed and add an unnecessary cost to the meter.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

H3 interface has been operational since our initial implementation.

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?
Our web portal uses H3 interface to allow consumers to access and download their consumption data.

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces?
The main barrier is economic. The more interfaces the meter was required to offer, the more expensive the meter would be, not only at the time of purchasing the meter, but also at the time of installing, commissioning and operating the meter for the duration of its lifetime. We strongly recommend that, when considering interfaces, we consider interfaces with the metering architecture as a whole, and not interfaces exclusively with the meter itself. This open approach could turn a negative cost-benefit analysis into a positive one, as the cost of the meter is the fundamental cost identified in all business cases.

If yes, how is solving of these challenges or barriers foreseen?
As stated above, by considering an open approach consisting of de-centralising the smartness of the smart meter architecture.

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?
As said before, the implementation of the H1 interface is not foreseen in Spain.

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents.
N/A

5.3 What physical interface and communication standards are or will be used on the H2 interface?
H2 interface does not exist. That would add unnecessary cost to the meter, possibly for the immediate benefit of some vendors but certainly to the detriment of the consumer.

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents.
N/A

5.5 What physical interface and communication standards are or will be used on the H3 interface?
The physical interfaces currently used are a combination of PRIME-PLC (now international standard ITU-T recommendation G.9901/G.9904) and a variety of WAN communication media.

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.**

A DLMS-COSEM profile has been defined by major Spanish DNOs (EDP-HidroCantabrico, Gas Natural Fenosa and Iberdrola) and DNO associations CIDE and ASEME. This profile applies to between 55% and 60% of all supply points in the country.

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?

For the web portal and customer services, specific file formats have been defined at an ad-hoc Working Group led by the NRA (Comisión Nacional de Mercados y Competencia), so consumers will be able to access their consumption data in a universal format, similar to the Green Button initiative in the United States of America.

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**.**

Please contact Spanish NRA (Comisión Nacional de Mercados y Competencia).

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)

Yes, Spanish smart metering systems support remote firmware update, which will allow for future upgrade of functionalities.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing)

The term interoperability is prone to generating certain confusion, depending on the context in which the term is used.

In the context of the entity responsible for deploying and commissioning, operating and maintaining a smart metering infrastructure, composed of a high volume of devices –the meter certainly being the largest in volume-, once the telecommunication media has been chosen, the terms interoperability and interchangeability are synonyms (please see article Smart meter interoperability and interchangeability in Europe, by ESMIG). **For PRIME PLC meters, and thanks to a) PRIME being an international standard and b) the official certification and conformance testing procedures defined, interoperability has been fully achieved.**

In the context of the exchange of data between different entities, i.e. between DNOs and consumers, or between DNOs and retailers, interoperability will be achieved by fulfilling the data formats referred to in 5.7 and 5.8.

Endesa

Identification

A. Member State: SPAIN
B. Organization (who filled in this questionnaire):
- Name: ENDESA DISTRIBUCION ELECTRICA (EDE)
- Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions:
    - PILAR NIETO HERNANDEZ
    - pilar.nieto@endesa.es
    - +34695224770
- Type: **ELECTRICITY DISTRIBUTION COMPANY**

C. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **[ENDESA IS THE DISTRIBUTION COMPANY IN ANDALUCIA, SOUTH EXTREMADURA, CATALUÑA, ARAGON, CANARIAS AND BALEARES]**
D. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be: **ABOUT 43% OF DISTRIBUTION CUSTOMERS**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   The new Spanish regulation for electricity billing establishes that the electricity bill for residential customer will be based in the real hourly consumption and the real hourly prices of the energy. The procedures developed to put in place this new billing scheme establish the obligation of the DSOs to create a web portal where the customers can consult the information of their hourly consumption (load curves).EDE, according to these procedures, is working to put in place web pages to fulfill this requirement, thus we considered this functionality will be implemented in the EDE smart metering systems in the next months.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
The possibility to register and collect the load curves of the customers is a functionality included in the EDE smart metering system. However, when the massive deployment started in 2010, it was not foreseen the need to collect massively the load curves for all the customers. Due to the new billing regulation EDE is adapting its systems to collect all the load curves for billing purposes. Among

others modifications, an important increase in the IT infrastructures is been addressed to deal with the huge amount of data involved in the new billing scheme.

1.2 Will the information provided to the consumer be free of charge? [Yes]
If not provided free of charge, what is the business model (e.g. charging model)?
The hourly consumption information will be available to the customers and authorized third parties free of charge.

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
The Spanish regulation currently do not mandate this functionality.
However, EDE is working in developing a solution to provide information to the customer directly from the smart meter to an in-home device that will support frequent updates of information in line with the recommendation of 15 minutes. Some pilot projects are foreseen in the next months

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
This functionality is not included in the original specification of the Spanish smart metering systems, thus, according to the results of the current developments and pilot projects, it would be implemented in a future upgrade of the systems.

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].
As the functionality is not yet in place, a frequency or a limit cannot be assessed at this time, but the developments are working in the line to provide information within the recommended 15 minutes.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
The smart meters that are being rolled-out by EDE already include up to 6 tariff periods, time of use registers and remote tariff control, as all this was a requirement of the Spanish regulation that mandated the smart metering roll-out. Moreover, with the new Spanish billing scheme, advanced tariff systems can be put in place. Functionality f) is thus fully supported.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
As said before, multiple tariff periods, time of use registers and remote tariff control is included since initial implementation.

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
Please cross the cells in the following table

interface. A technical issue is related to disturbances because of potential emissions within the CENELEC A frequency band used by the PLC communications, due to customer devices. This issue needs a regulatory solution.

Another challenge of the implementation of the H1 and H2 interfaces is that corresponding gateways or devices need to be installed within the electrical installation of the customer.

If yes, how is solving of these challenges or barriers foreseen?
The issue on the emissions within the CENELEC A frequency band requires a solution at International/European level, and is currently being treated within the IEC SC77A Technical Committee

Interoperability H1, H2, H3, and other interfaces

3.1 What physical interface and communication standards are or will be used on the H1 interface?

As said before, EDE doesn't foresee the implementation of the H1 interface.

3.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents. N/A

3.3What physical interface and communication standards are or will be used on the H2 interface?

Current developments and pilot project work in line to implement H2 interface with PLC communication. The standards foreseen for this interface are based in the same PLC standards already used for communication between meter and concentrator. In the case of EDE this standard is CLC/TS 50568-4/-8 (SMITP).

3.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents.

Definitions of the extensions to CLC/TS 50568-4/-8 for *meter-to-gateway* interface are progress in the Meters and More Association.

3.5 What physical interface and communication standards are or will be used on the H3 interface?

No H3 interface is currently foreseen.

3.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents.

No H3 interface is currently foreseen.

3.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?

HTTPS standards will be used for the web portal.

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents.

Data formatting has already been defined in an ad-hoc working group created by the Spanish NRA (National Regulatory Authority) in 2014 with the participation of DSOs and retailers, and once officially published these formats will be used for the exchange of information between agents.

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? (yes/no) Please explain what elements of the infrastructure are upgradable (hardware and software)

EDE smart metering system is scalable and supports remote firmware update, what will allow for future upgrades of functionalities.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing)

Official certification and conformance testing procedures are applied.

Spain Gas Natural

V. Member State: **SPAIN**
W. Organization (who filled in this questionnaire):
X. Name: **Gas Natural Fenosa – Unión Fenosa Distribución (UFD)**
Y. Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions:
  a. Name: **Juan Manuel Galán**
  b. E-mail**: jgalans@gasnatural.com**
  c. Telephone number: **+34 915676103**
Z. Type: **Distributor**
AA. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **UFD distributes electricity over 12% of the territory of Spain.**
BB. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: The roll-out in GNF includes 100% of residential customers, from 2008 to 2018**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

2. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   UFD has developed a web portal and a smart-phone app where customers can consult the information of their hourly consumption (load curves).

   2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   The possibility to collect and register customers load curves is a functionality implemented in all Spanish smart metering systems since the initial implementation. This requirement was defined in depth later, in the Royal Decree 1718/2012 of December 28th, 2012.

   2.2 Will the information provided to the consumer be free of charge? **[Yes/No]**
   If not provided free of charge, what is the business model (e.g. charging model)?
   YES. Information provided to the consumer is free of charge.

3. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   The current Spanish regulation does not mandate functionality (b). However, UFD is in the process of developing functionality (b).

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

This functionality is not included in the requirements for the Spanish smart metering systems. However, GNF has developed it recently.

3.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].

In Spain, the energy-producing products are negotiated under an hourly basis. Therefore, the frequency of the information provided by default to consumers should also be hourly.

UFD provides hourly consumption data to customers. This information is available in the web portal and the smart-phone app the following day.

4. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

YES. The smart meters that are being rolled-out in Spain already include up to 6 tariff periods, time of use registers and remote tariff control, according to the Spanish regulation mandates for the smart metering roll-out.

4.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

As mentioned before, multiple tariff periods, time of use registers and remote tariff control is included since the initial implementation.

5. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?

Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)			**X**	
b)			**X**	

In the following UFD considers a web portal as H3 interface.

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

NO up the moment. H1 interface is not implemented and it will not be implemented, as the majority of residential meters in Spain are not located in customers' homes but in collective metering rooms, therefore making it difficult for H1 inteface to be established

between these metering rooms, usually located on the basement, and the customer's home.

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

H2 interface has not been implemented since the initial roll-out.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

Web portal and smart-phone app have been implemented by UFD recently.

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?

No up the moment

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces?

Since a high percentage of residential meters are not placed in the customer´s home, the implementation of local interfaces to fulfill functionality b) may be based on PLC interface. A technical issue is related to disturbances because of potential emissions within the CENELEC A frequency band used by the PLC communications, due to customer devices. This issue needs a regulatory solution. A wider CENELEC A frequency band for the DSOs is necessary in order to implement local interfaces.

Another challenge of the implementation of the H1 and H2 interfaces is that corresponding gateways or devices may need to be installed within the customer electrical installation.

If yes, how is solving of these challenges or barriers foreseen?

The issue on the emissions within the CENELEC A frequency band requires a solution at International/European level, and is currently being treated within the IEC SC77A Technical Committee.

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?
As mentioned before, the implementation of the H1 interface is not foreseen in Spain.

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents.
Not Applicable

5.3 What physical interface and communication standards are or will be used on the H2 interface?
H2 interface is not implemented in UFD roll out.

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents.
Not applicable

5.5 What physical interface and communication standards are or will be used on the H3 interface?
UFD is using https standards a H3 interface.

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.**
Data formatting has already been defined in an ad-hoc working group created by the Spanish NRA (National Regulatory Authority) in 2014 with the participation of DSOs and retailers, and once officially published these formats will be used for the exchange of information between agents.

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?
For the web portal, a specific file format is being defined at a Sectorial Working Group lead by the NRA (Comisión Nacional de Mercados y Competencia).

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**.**
N/A

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)
Yes, Spanish smart metering systems support remote firmware update, what will allow for future upgrades of functionalities, within the scope of the applied technologies. But hardware elements are not upgradable.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing)
UFD is using PLC PRIME technology and DLMS-COSEM data model and application layer. Official certification and conformance testing procedures are applied.

Unesa

CC. Member State: **SPAIN**

DD. Organization (who filled in this questionnaire):

- Name: **Asociación Española de la Industria Eléctrica (UNESA)**
- Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions:
  - Name: **Carlos González**
  - E-mail**: cgonzalez@unesa.es**
  - Telephone number: **+34 915674948**

EE. Type: **NATIONAL ELECTRICITY INDUSTRY ASSOCIATION**

FF. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **UNESA's DSOs distribute electricity all over Spain except for Ceuta and Melilla (Autonomous Cities) and 349 small municipalities.**

GG. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: UNESA's DSOs represent 98% of distribution business in Spain**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

   YES. Customers and retailers received meter readings frequently enough. For those customers equipped with a smart meter, this frequency has doubled from bi-monthly invoices to monthly invoices. Furthermore, the Spanish DSOs have developed a web portal where customers can consult the information of their hourly consumption (load curves).

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

The possibility to collect and register customers load curves is a functionality implemented in all Spanish smart metering systems since the initial implementation. This requirement was defined in depth later, in the Royal Decree 1718/2012 of December 28th, 2012.

1.2 Will the information provided to the consumer be free of charge? **[Yes/No]**

If not provided free of charge, what is the business model (e.g. charging model)?

YES. Information provided to the consumer is free of charge.

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   The current Spanish regulation does not mandate functionality (b). However, some DSOs have already developed functionality (b) and some other DSOs are in the process of developing functionality (b).

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   This functionality is not included in the requirements for the Spanish smart metering systems. However, some DSOs developed this functionality at a later stage, and some other DSOs are developing it.

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].
   Some DSOs have established mechanisms so that consumers are empowered to request information at a frequency of their choice. Some other DSOs are currently developing solutions in line with the 15' recommendation.
   Regarding the statements in the introduction, saying that *"The rate has to be adapted to the response time of the energy-consuming or energy-producing products. The general consensus is that an update rate of every 15 minutes is needed at least"*, we have to say that we agree on the first sentence, but the general consensus isn't an update rate of every 15 minutes. In Spain, the energy-producing products are negotiated under an hourly basis. Therefore, the frequency of the information provided by default to consumers should also be hourly.

   This important issue is also highlighted in the "Remarks of Associations representing DSOs on the ACER's draft qualified recommendation on the Network Code on Electricity Balancing", where its clearly shown that no CBA can currently support a EU wide harmonization of the imbalance settlement period of 15 min, and therefore a need for an update rate of every 15 minutes for meters.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   YES. The smart meters that are being rolled-out in Spain already include up to 6 tariff periods, time of use registers and remote tariff control, according to the Spanish regulation mandates for the smart metering roll-out.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   As mentioned before, multiple tariff periods, time of use registers and remote tariff control is included since the initial implementation.

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?

Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)			**X**	
b)			**X**	

In the following a web portal is considered as H3 interface, although some DSOs don´t agree with this interpretation.

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

NO. H1 interface is not implemented and it will not be implemented, as the majority of residential meters in Spain are not located in customers' homes but in collective metering rooms, therefore making it difficult for H1 inteface to be established between these metering rooms, usually located on the basement, and the customer's home.

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

H2 interface has not been implemented since the initial roll-out. However, some DSOs are developing trials to provide functionality b) through H2 interface, and based on the results it would be implemented in a later upgrade of the systems.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

Web portal has been implemented by some Spanish DSOs.

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?

The Spanish DSO have already implemented or are in the process of implementing web portals that allow customers to visualize and download their detail consumption.

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces?

Since a high percentage of residential meters are not placed in the customer´s home, the implementation of local interfaces to fulfill functionality b) may be based on PLC interface. A technical issue is related to disturbances because of potential emissions within the CENELEC A frequency band used by the PLC communications, due to customer devices. This issue needs a regulatory solution. A wider CENELEC A frequency band for the DSOs is necessary in order to implement local interfaces.

Another challenge of the implementation of the H1 and H2 interfaces is that corresponding gateways or devices may need to be installed within the customer electrical installation.

If yes, how is solving of these challenges or barriers foreseen?

The issue on the emissions within the CENELEC A frequency band requires a solution at International/European level, and is currently being treated within the IEC SC77A Technical Committee.

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?

As mentioned before, the implementation of the H1 interface is not foreseen in Spain.

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents.

Not Applicable

5.3 What physical interface and communication standards are or will be used on the H2 interface?

Current developments implement H2 interface with PLC communication. The standards foreseen for this interface are based on the same PLC standards already used for communication between meter and concentrator, which are Meters and More (CLC TS50568-4 /-8, extensions for meter-to-gateway interface in progress) and PRIME (ITU-T G.9904).

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents.

In Spain, interoperability and interchangeability have already been achieved.

5.5 What physical interface and communication standards are or will be used on the H3 interface?

DSOs are using https standards a H3 interface.

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.**

Data formatting has already been defined in an ad-hoc working group created by the Spanish NRA (National Regulatory Authority) in 2014 with the participation of DSOs and retailers, and once officially published these formats will be used for the exchange of information between agents.

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?

For the web portal, a specific file format is being defined at a Sectorial Working Group lead by the NRA (Comisión Nacional de Mercados y Competencia).

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**.**

N/A

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)

Yes, Spanish smart metering systems support remote firmware update, what will allow for future upgrades of functionalities, within the scope of the applied technologies.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing)

For some technologies official certification and conformance testing procedures are applied. Other technologies have already achieved full interoperability.

Spain CIDE

A. Member State: **Spain**
B. Organization (who filled in this questionnaire]:
- Name: **CIDE Asociación de Distribuidores**
- Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions:
    - **Name: Marta Viñas Gómez**
    - **Email address: mvinas@cide.net**
    - **Telephone number: 913532581**
- Type: **DSO Association**

C. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **CIDE's DSOs distribute electricity in 13 Regional Communities**
D. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be: **1%**

CIDE Asociación de Distribuidores has 204 associates and given the limited time to respond this request, it was not possible to share this information with all our associates. For this reason, all the questions will be answered considering PRIME standard, which is the one that CIDE is working with and the one authorized by the Ministry of Industry, Energy and Tourism in 2009.

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

   The Royal Decree 216/2014 establishes that the electricity bill for residential customers will be based in the real hourly consumption and real hourly price of energy. The procedure establish the obligation of DSOs to create a web portal where the customers can consult the information of their hourly consumption. Our DSOs are working in order to fulfill this requirement.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
The Royal Decree 216/2014 was established after the initial implementation

1.2 Will the information provided to the consumer be free of charge? Yes
If not provided free of charge, what is the business model (e.g. charging model)?

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

No, functionality (b) is not mandate in the current Spanish regulation

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

The functionality (b), as mentioned before, was not included in the initial regulation for the Spanish Smart Metering system

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].

The current Spanish regulation does not mandate functionality (b), so a frequency or limit cannot be informed.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

Yes, since initial implementation, the Smart meters include up to 6 tariff periods, time of use registers and remote tariff control.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

As mentioned before, this was included in the initial implementation

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)			X [1]	
b)				

[1] **We are currently developing a web portal where the customers can consult the information of their hourly consumption as per Royal Decree 216/2014**

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

No. H1 is not implemented, most of residential smart meters are located in collective metering rooms, so it is difficult for H1 interface to be established between these metering rooms and the customer's home.

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

No. H2 has not been implemented in the initial implementation.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

As we mentioned in question four, we are developing interface H3 as per Royal Decree 216/2014

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?

There are no other interfaces implemented from the ones mentioned in questions 4 and 4.3

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? Yes
If yes, how is solving of these challenges or barriers foreseen?

As we mentioned in question 4.1 due to the number of residential Smart meters located in collective metering rooms, the implementation of local interfaces to fulfill functionality b) may be based on PLC interface. There is a technical issue related to disturbances due to potential emissions within CENELEC A frequency band used by PLC communications due to customer devices. This issue needs a regulatory solution.

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?

As we mentioned before, the implementation of the H1 interface is not foreseen.

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents.

N/A

5.3What physical interface and communication standards are or will be used on the H2 interface?

The standards for this interface are based on the same PLC standards already used between smart meters and concentrator (PRIME ITU-T G.9904)

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents.

PRIME interoperability has already been achieved (see annex 1)

5.5 What physical interface and communication standards are or will be used on the H3 interface?

Https standards

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents.

Data formatting has already been defined in 2014 in a working group created by the National Regulatory Authority. Once they are officially published, they will be used for the exchange of information.

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?

For the web portal, the National Regulatory Authority is defining a specific file format.

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents.

See annex 2

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)

Yes, Smart Metering systems support remote firmware update

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing) [open answer].

Official certification and conformance testing procedures are applied.

Spain APYDE

Identification

A. Member State: **[Spain]**
B. Organization (who filled in this questionnaire):
- Name: **[APYDE]**
- Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: **[Jose Manuel Gonzalez Estevez/apyde@apyde.com/ +34981569640]**
- Type: **[Association]**

C. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **[Small utilities from Spain]**
D. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be: **[In the end 2014 35%, in the end 2016 35% and in the end 2018 30%]**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [No, In Spain the responsible of the reading is the DSO and the architecture system has been designed to collect data information from meters to data concentrator and also from data concentrator and MDC system.
   The values are recording in a data base from which, the transaction information is made to the retailer]

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
E. **[Initial and the planning will be [In the end 2016 35% and in the end 2018 30% meter installed and integrated in the billing system]**

1.2 Will the information provided to the consumer be free of charge? **[Yes]**
If not provided free of charge, what is the business model (e.g. charging model)?

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?

[No, in Spain the consumption is updated hourly but isn't showing directly to the customers after day before to finish and close the consumption daily]

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Not planned]

2.2 What is the frequency of the information provision to consumers? **[every 60 minutes by day]**. Can this frequency be changed? **[Yes]**. If yes what are the limits? **[60 seconds from MDC strategies]**.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
[Not yet defined in PRIME protocol]

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[Not planned]

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
Please cross the cells in the following table

[Not applicable]

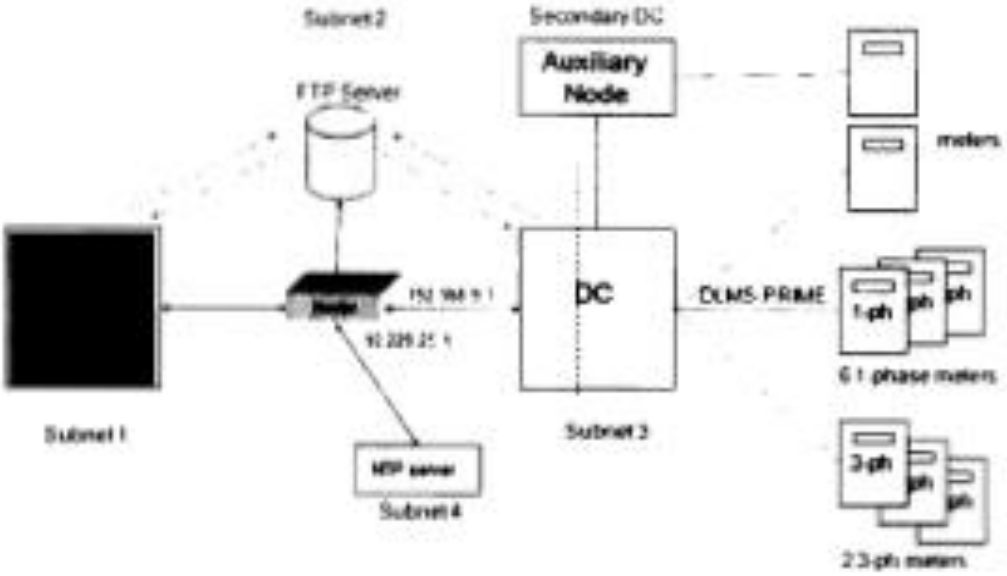
Interface / Functionality	H1	H2	H3	Other
a)				
b)				

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Not planned]

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Not planned]

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Not planned]

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?
[The functionalities for customers are from retailers using the data that has been provided from DSO with format hourly every day and the invoice is monthly



]

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? [yes]
If yes, how is solving of these challenges or barriers foreseen?
[It should develop the legal aspects of confidentiality of data protection, cybersecurity and regulate necessary specifications for proper use]

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?
[Not defined]
5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents.
[Not defined]

5.3What physical interface and communication standards are or will be used on the H2 interface?
[We use the interfaces and standard that has been defined in the PRIME protocol but to H2 interface is not defined].

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents. **[Not defined]**

5.5 What physical interface and communication standards are or will be used on the H3 interface?

6 **[Not defined]**

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents. **[Not defined]**

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][Also specify specific versions and additions that are implemented].

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents. **[Not defined]**

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? **[Yes, PRIME-Alliance ensure the evolution and upgrades according the firmware and software that could be needed by meter and DCU and also the software to upgrade from MDC to DCU]**

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing)
[From the PRIME standard evolution].

Spain ASEMVE2

Identification

A. Member State: [Spain]

B. Organization (who filled in this questionnaire]:

- Name: [ASEME]
- Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: [Ramon Gallart Fernandez/rgallart@estabanell.cat/aseme@aseme.org/+34938609100]
- Type: [Association]

C. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: [Spanish utilities with less than 100.000 customers]

D. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be: [Actually ASEME DSO has been deployed a 2%. Threshold in the end 2014 35%, in the end 2016 35% and in the end 2018 30%.]

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [No, In Spain the responsible of the reading is the DSO and the architecture system has been designed to collect data information from meters to data concentrator and also from data concentrator and MDC system.
   The values are recording in a data base from which, the transaction information is made to the retailer]

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Not planned]

1.2 Will the information provided to the consumer be free of charge? [Not planned]

If not provided free of charge, what is the business model (e.g. charging model)?

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
[No, in Spain the consumption is updated hourly but isn't showing directly to the customers after day before to finish and close the consumption daily]

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Not planned]

2.2 What is the frequency of the information provision to consumers? [every 60 minutes by day]. Can this frequency be changed? [Yes]. If yes what are the limits? [60 seconds from MDC strategies].

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
[Not yet defined in PRIME protocol]

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[Not planned]

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
Please cross the cells in the following table

[Not applicable]

Interface Functionality	H1	H2	H3	Other
a)				
b)				

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Not planned]

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

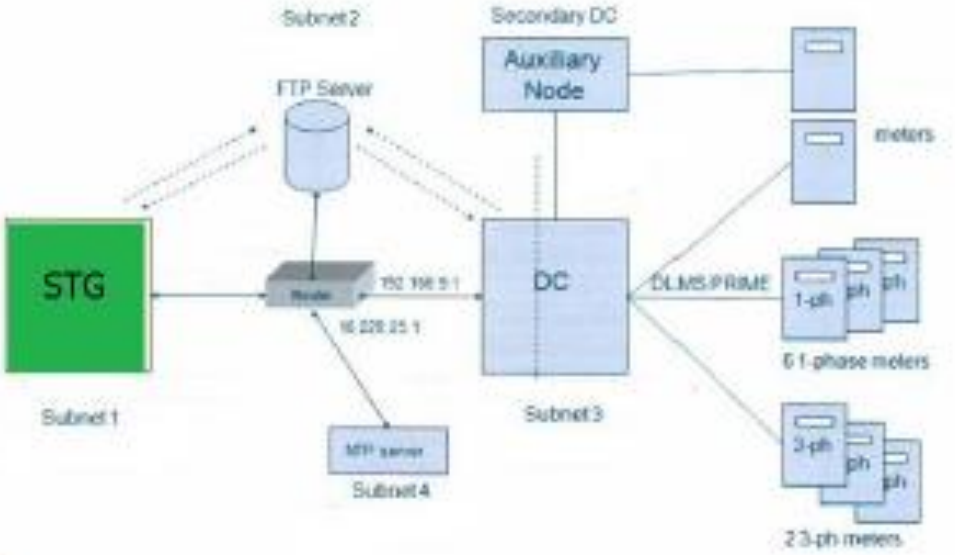
[Not planned]

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[Not planned]

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades?

[The functionalities for customers are from retailers using the data that has been provided from DSO with format hourly every day and the invoice is monthly



]

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? **[yes]**

If yes, how is solving of these challenges or barriers foreseen?

[It should develop the legal aspects of confidentiality of data protection, cybersecurity and regulate necessary specifications for proper use]

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?

[Not defined]

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents.
[Not defined]

5.3What physical interface and communication standards are or will be used on the H2 interface?
[We use the interfaces and standard that has been defined in the PRIME protocol but to H2 interface is not defined].

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents.
[Not defined]

5.5 What physical interface and communication standards are or will be used on the H3 interface?

6 [Not defined]

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents.
[Not defined]

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified]][Also specify specific versions and additions that are implemented].

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents. [Not defined]

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [Yes, PRIME-Alliance ensure the evolution and upgrades according the firmware and software that could be needed by meter and DCU and also the software to upgrade from MDC to DCU]

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing)
[From the PRIME standard evolution].

(*) The PRIME ALLIANCE (PRIME = PoweRline Intelligent Metering Evolution) is focused on the development of a new open, public and non-proprietary telecom solution which will

support not only smart metering functionalities but also the progress towards the Smart Grid. Power line communications is the most suitable and natural technology to provide the needed telecoms performance, even in complex underground electricity grids.(www.prime-alliance.org)

Agrupación de Fabricantes de Contadores Eléctricos

AFCE

Respuesta a la petición de información para el grupo de trabajo de interoperabilidad de los contadores inteligentes de la Comisión Europea.

El presente documento detalla la posición de la Agrupación de Fabricantes de Contadores Eléctricos (AFCE) con relación a la petición de información para el grupo de trabajo de interoperabilidad de los contadores inteligentes de la Comisión Europea.

Cuestionario

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation]
   No
   Los nuevos contadores que se están desplegando tienen un display en el que se muestra información de los consumos aunque hay que tener en cuenta que, en España, el contador suele estar ubicado con el resto de contadores de las viviendas del edificio en un cuarto específico (cuarto de contadores) y no en la vivienda.
   Por otro lado, la mayoría de grandes compañías distribuidoras están trabajando en la implementación de zonas privadas en sus páginas web para que los clientes puedan acceder a sus datos de consumo, pero a priori, parece que esta información no se va a dar en tiempo real.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Initial, later upgrades, next roll out + planning]
En el despliegue inicial no, ni tampoco a través de las posteriores actuaciones previstas. No conocemos los planes futuros.

1.2 Will the information provided to the consumer be free of charge? **[Yes/No]**
If not provided free of charge, what is the business model (e.g. charging model)?

No aplica (N/A) ya que la funcionalidad a) no está planificada.

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation]
   La funcionalidad a) no está planificada, con lo cual no es posible responder a esta pregunta.

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial, later upgrades, next roll out + planning]
   En el despliegue inicial no, ni tampoco a través de las posteriores actuaciones previstas. No conocemos los planes futuros.

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].
   Debido a que la funcionalidad a) no está implementada, no podemos responder con qué frecuencia se suministra la información.
   A través de los portales web de las compañías distribuidoras, las frecuencias serán las que establezcan éstas.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation]
   Los contadores aceptan hasta 6 periodos tarifarios por contrato, permite hasta 24 cambios de los periodos tarifarios y la definición de días especiales. Es posible cambiar remotamente la estructura tarifaria.
   No se permite la transferencia automática de información sobre opciones tarifarias avanzadas a los clientes finales, ya que la funcionalidad a) no está implementada, pero se podría consultar a través de un portal web (véase respuesta a pregunta 1).

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial, later upgrades, next roll out + planning]
   La estructura tarifaria se ha tenido en cuenta desde el despliegue inicial, se puede actualizar dentro de las capacidades previstas por el contador y sigue previsto en el resto del despliegue.
   La transferencia automática de información sobre opciones tarifarias avanzadas a los clientes finales no está implementada en el despliegue inicial ni en las posteriores actuaciones previstas. No conocemos los planes futuros.

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
   Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)				
b)				

La tabla no contiene ninguna X ya que ningún interfaz local implementado para ninguna de las dos funcionalidades.

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[Initial], later upgrades, new roll-out + planning]

En el despliegue inicial no ni tampoco a través de las posteriores actuaciones previstas. No conocemos los planes futuros.

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[Initial], later upgrades, new roll-out + planning]

En el despliegue inicial no ni tampoco a través de las posteriores actuaciones previstas. No conocemos los planes futuros.

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?

[Initial], later upgrades, new roll-out + planning]

En el despliegue inicial no ni tampoco a través de las posteriores actuaciones previstas. No conocemos los planes futuros.

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades? **[Provide descriptions of these interfaces: what information, what channel, what time resolution, what refresh rate, whether planned initially or through later upgrades. Clarify if possible with a diagram related to the one in Annex A]**

No

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? **[yes/no]**

If yes, how is solving of these challenges or barriers foreseen?

[open answer]

No. Los fabricantes fabrican los contadores bajo las prescripciones de la compañía eléctrica.

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][Also specify specific versions and additions that are implemented].
N/A

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**. [open answer]**
N/A

5.3 What physical interface and communication standards are or will be used on the H2 interface?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][Also specify specific versions and additions that are implemented].
N/A

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**. [open answer]**
N/A

5.5 What physical interface and communication standards are or will be used on the H3 interface?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][Also specify specific versions and additions that are implemented].
N/A

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**. [open answer]**
N/A

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][Also specify specific versions and additions that are implemented].
N/A

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**. [open answer]**
N/A

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)

En caso de que se definiesen nuevas funcionalidades relacionadas con el consumidor, sólo se podrían implementar vía software y dentro de las limitaciones de las capacidades del contador. Se podrían implementar por ejemplo, modificaciones relacionadas con la estructura tarifaria.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing) [open answer].

En España, las compañías distribuidoras Iberdrola, GNF, HC, ASEME y CIDE crearon un foro nacional donde se definieron las especificaciones para sus contadores de telegestión con el objetivo de que fueran interoperables.

Existen grupos de trabajo que mantienen el grupo de especificaciones vivo para garantizar que sigue manteniéndose la interoperabilidad.

AFCE está constituida por los siguientes fabricantes:

NOTE (by the Editorial Team of EG1 on Spanish data)

There is a discrepancy in the answers received from the DSOs in Spain regarding functionality (b). Although all three DSOs that responded provide information to consumers via a website, not complying though to the requirement “an update rate of at least every 15 minutes”, two of them indicate not having functionality (b) and one of them claims to have functionality (b). One of the three DSOs indicates that they are working on an H2 interface that will provide more frequent readings in a later stage, by (software) upgrading the meter. Therefore in the final results the answer of having functionality (b) for Spain has been recorded as “No”.

16. Sweden

Identification

DD. Member State: **[Sweden]**
EE. Organization (who filled in this questionnaire):
FF. Name: [**…..]**
GG. Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: **[Name / email address/ telephone number]**
HH. Type: **[DSO, branch association, regulator, etc., including name]**
II. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **[clarification]**
JJ. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: [x%]**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

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Postal address Box 155, SE-631 03 Eskilstuna, Sweden
Visit Kungsgatan 43, Eskilstuna | Drottninggatan 26, Stockholm
Phone +46 16 16 27 46 | or +46 16 16 27 00
www.ei.se

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation]
   No, however the Swedish regulator has recommended that this functionality (an open standardized interface providing near real time readings to the customer) should be required for all meters for the second generation of smart meters suggested to be rolled out between 2017 and 2025.

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Initial, later upgrades, next roll out + planning]
Next roll out

1.2 Will the information provided to the consumer be free of charge? **[Yes/No]**
If not provided free of charge, what is the business model (e.g. charging model)?
Yes

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation]
   No

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial, later upgrades, next roll out + planning]
   Next roll out

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].
   Near real time. Exact frequency not defined yet but it will be a matter of seconds.

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented?
   [Yes/ No, comments and argumentation]
   No. We see that the customer should definitely be able to receive price signals and/or information on advanced tariff structures. However, we see that this information should not necessarily be provided through the metering system. There are other ways of communication that may be more efficient (for instance through smartphone applications etc.). The best way to communicate will differ between different customers and the solutions should be provided by the market actors in competition.

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial, later upgrades, next roll out + planning]

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
   Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)				
b)				

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial], later upgrades, new roll-out + planning]

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
   [Initial], later upgrades, new roll-out + planning]

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)?
[Initial], later upgrades, new roll-out + planning]

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades? **[Provide descriptions of these interfaces: what information, what channel, what time resolution, what refresh rate, whether planned initially or through later upgrades. Clarify if possible with a diagram related to the one in Annex A]**

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? **[yes/no]**
If yes, how is solving of these challenges or barriers foreseen?
[open answer]

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][**Also specify specific versions and additions that are implemented].**
Answer: Not defined yet.

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**.**
[open answer]

5.3 What physical interface and communication standards are or will be used on the H2 interface?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][**Also specify specific versions and additions that are implemented].**

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**.**
[open answer]

5.5 What physical interface and communication standards are or will be used on the H3 interface?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][**Also specify specific versions and additions that are implemented].**

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.**
[open answer]

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?
[CENCENELEC/ETSI standards/ IEC/ISO standards/others (to be clarified)][**Also specify specific versions and additions that are implemented].**

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**. [open answer]**

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? [yes/no] Please explain what elements of the infrastructure are upgradable (hardware and software)
There are no such requirements today, even though a lot of the meters have this functionality anyway. For the next generation of smart meters (suggested to be implemented between 2017 and 2025) the Swedish regulator has recommended that it should be mandatory to be able to remotely upgrade software and settings.

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing) [open answer].

17. UK

Identification

A. Member State: **United Kingdom**
B. Organization (who filled in this questionnaire):
C. Name: **Department of Energy and Climate Change**
D. Contact person ,who filled in or is related to the answers on this questionnaire, who can be contacted in case of questions: **Seamus Gallagher or Peter Morgan (seamus.gallagher@decc.gsi.gov.uk/ peter.morgan@decc.gsi.gov.uk)**
E. Type: **Government Department**
F. If you are only partly responsible for the definition of requirements for the smart metering functionalities, interfaces and standards, please clarify for which parts or geographical area: **DECC is responsible for the rollout in Great Britain (i.e. not Northern Ireland; responsibility for energy markets in Northern Ireland lies with the Northern Ireland Executive's Department of Enterprise, Trade and Investment.**
G. If you are (partly) responsible for the roll-out of Smart Meters in your country, please indicate for which part of the national roll-out that will be**: as above – all of UK except Northern Ireland.**

Where appropriate and in case there are differences, please answer the questions below separately for gas and electricity.

Functionalities

Where there are functional differences (related to functionalities (a), (b) or (f)) in a roll-out already (partly) realised, please specify the stages in the roll-out and quantities of meters per stage and answer the questions below per stage.

1. Is functionality (a) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented? **Yes**

1.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Initial**

1.2 Will the information provided to the consumer be free of charge? **Yes**
If not provided free of charge, what is the business model (e.g. charging model)?

2. Is functionality (b) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented? **Yes**

2.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Initial**

2.2 What is the frequency of the information provision to consumers? [every x seconds/minutes]. Can this frequency be changed? [Yes/No]. If yes what are the limits? [x-y seconds/minutes].
Smart Metering Home Area Network (SMHAN) interface: Information is provided at least every 10 seconds for electricity and at least every 30 minutes for gas. Devices connected to the SMHAN can request data this frequently or less frequently.

Smart Metering Wide Area Network (SMWAN) interface: Electricity and gas consumption information for each 30 minute period in the past 13 months available. Less granular data also available (for example daily reads).

SMHAN – A communications network allowing the exchange of information between smart metering devices at the consumer premises

SMWAN – A communications network allowing the exchange of information between smart metering devices and remote parties

3. Is functionality (f) (as described in the minimum functionalities in the Commission Recommendation (2012/148/EU)) implemented? **Yes**

3.1 Is this implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Initial**

4. What local interfaces within the metering infrastructure (see diagram: H1, H2, H3) are implemented for functionalities a) and b)?
Please cross the cells in the following table

Interface Functionality	H1	H2	H3	Other
a)	No	Yes	No	No
b)	No	Yes	No	No

4.1 Is H1 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Not applicable**

4.2 Is H2 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Initial**

4.3 Is H3 implemented in the initial implementation, through later upgrades or a next roll-out (please include planning)? **Not applicable**

4.4 Are other interfaces implemented in relation to the functionalities for consumer information provision a), b) in the initial implementation or through later upgrades? **No**

4.5 Are there any technical, legal and regulatory challenges or barriers related to the implementation of the local H1, H2 or H3 or alternative interfaces? If yes, how is solving of these challenges or barriers foreseen? **The current H2 interface is based on 2.4GHz licence exempt spectrum which is expected to serve approximately 70% of GB premises. Industry is developing a complementary 868MHz licence exempt spectrum solution which will serve approximately 95% of GB premises. In addition DECC is working with industry to develop solutions for situations where additional equipment is required to extend the range of 2.4GHz / 868MHz equipment.**

Interoperability H1, H2, H3, and other interfaces

5.1 What physical interface and communication standards are or will be used on the H1 interface? **Not applicable**

5.2 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H1 interface? Please provide a copy of related documents**.** **Not applicable**

5.3 What physical interface and communication standards are or will be used on the H2 interface?

There are two physical interfaces used for H2:

(1) 2.4GHz interface (smart metering home area network): ZigBee (pr EN 16838) messages

(2) Cellular Radio or Long Range Radio interface (wide area network): Messages based on DLMS COSEM (IEC 62056), ASN1 (Rec. ITU-T X.680, X.690 and X.890 series), ZigBee (pr EN 16838) as described in Great Britain Companion Specification (see link in 5.4)

5.4 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H2 interface? Please provide a copy of related documents**.** **Great Britain Companion Specification v0.8.1 (https://www.gov.uk/government/consultations/smart-metering-implementation-programme-great-britain-companion-specification-version-08)**

5.5 What physical interface and communication standards are or will be used on the H3 interface? **Not applicable**

5.6 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the H3 interface? Please provide a copy of related documents**.** **Not applicable**

5.7 What physical interface and communication standards are or will be used on any alternative interfaces in relation to functionalities a), b) or f) (if applicable)?

None

5.8 What additional definitions (e.g. profiles / companion standards) are made in order to ensure interoperability on the alternative interfaces (if applicable). Please provide a copy of related documents**. Not applicable**

5.9 Is the infrastructure upgradable in order to cover new consumer-related functionalities in the future? Please explain what elements of the infrastructure are upgradable (hardware and software)

Yes – over the air firmware upgrade of metering equipment and communications hub is possible; hardware upgrade is possible via change control and notification under 98/34 of the relevant technical specifications. (a visit to the premises is required if equipment needs to be changed)

5.10 What measures are planned to ensure that interoperability is achieved and maintained? (think of interoperability and conformance testing) [open answer].

Mandated - ZigBee certification
Mandated – DLMS conformance certification
Mandated – energy suppliers are required to test their equipment for compliance with SMETS and GBCS, DCC are required to test communications hubs for compliance with SMETS and GBCS